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The major portion of this report for fiscal year April 1967 through March 1968 consists of summaries of research and programs of the past year (Part 1) and projections of those for the coming and subsequent years (Part 2). Part 1 describes (1) purposes, methods, and results of projects in the three major "domains" of "variables" studied and (2) facilities and research services that were active during the year. Included are reports on 14 subcategories in the behavioral domain where the emphasis is on various technical skills of teaching, on three subjects in the personological domain (teacher traits and characteristics), and on five elements of the institutional domain (teacher roles in their institutional setting). Part 2 is organized around three subdivisions of the major educational problem which has become the focus of the Center's program: the fundamental reformulation of the role of the teacher in the decades ahead. The three subproblem areas are heuristic teaching (teaching aimed at self-motivated and sustained inquiry which emphasizes affective as well as cognitive processes and places high premium upon the uniqueness of each pupil, teacher, and learning situation), the environment for teaching (especially school organization and management), and teaching the disadvantaged. Included also in the report are a short section on administrative and support programs, one on Center management and administration, and a bibliography of Center publications. (SP 001800 is a related document.) (JS)

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A. INTRODUCTION

The Stanford Center for Research and Development in Teaching, which began life at 770 Welch Road, Palo Alto, California, in September 1965, is a part of the School of Education at Stanford University. It was based upon the long-standing interest and productivity of a substantial number of the University faculty in research on teaching and extensive experimentation with newer programs for the education of teachers. It has provided a new setting for productive collaboration among a group of professional educators and behavioral scientists in achieving its fundamental aim. This aim, as stated in the original proposal for forming the Center, is to "improve teaching in American schools...." In the realization of this aim, the Center has conducted research and development activities in (a) teacher education programs, (b) teacher behaviors and characteristics, (c) pupil behaviors and characteristics, (d) aspects of the curriculum that affect teaching methods, and (e) the organizational contexts of teaching. The Center attempts to use its findings in the development of a theory of teaching, and in the improvement of the practice of teaching and the education of teachers.

B. FOCUS

The problem area of the Center has undergone a more substantial development this year than in any previous period and has taken a significantly new form. The earlier formulations of our problem area were to some extent derived from a summary and synthesis of the work undertaken in separate projects. The ideas were classified into "domains" of "variables" being studied.

We have moved now to focus the Center on a major educational problem, and then to formulate several significant sub-problems. The major problem in teaching emerging from our work in the Center during the last three years and now seen more clearly is that of the urgent need for a fundamental reformulation of the role of the teacher in the decades ahead. The Center's mission is to specify as clearly and on as empirical a basis as possible the direction of that reformulation, to help shape it, to fashion and validate programs for the training and retraining of teachers in accordance with it, and to develop and test materials and procedures for use in these new programs.

The problem is two-fold: A rapidly changing society is placing newer and ever higher demands on schools and teachers. An archaic system of tax support and unprecedented other demands for the tax dollar are making adequate financial support increasingly difficult to obtain. Consequently, the pressure for better and more efficient means for education is mounting. New knowledge accumulates so rapidly that curricula require frequent revision. A crescendo of demand for relevant education has arisen from the disadvantaged segment of our population, especially in the cities. A new educational technology, growing largely from the work of psychologists, most recently and prominently B. F. Skinner, and exploiting the modern computer, is opening up new possibilities for teaching and learning. A rising voice of disenchantment with old ways may be heard from the younger generation, first in our colleges, and now in the high schools. A major challenge is being hurled at the age-old view of the teacher as an oracle whose role is to fill the empty vessels known as students, the teacher being active and students passive. This challenge will have no validity if it is based on the false premise that teachers need not be expert, that youth need learn only that which they are at the moment interested in. It is valid when it suggests that there are many ways and places for learning and instruction beyond those provided by the traditional teacher in a standard classroom of 30 pupils. Furthermore, for a variety of reasons, the selection of what is to be learned from the mounting fund of what there is available to learn has become more urgent. The tendency, under current conditions in schools, of so many of the younger generation to "tune out" poses in new and baffling form the problem of how students may be genuinely involved in the work of the school and motivated to learn. In an age of increasing automation and affluence, new objectives for schooling, concerned with the cultivation of emotional and social qualities as well as traditional intellectual ones,rise to prominence. All of these forces call for new kinds of teaching.

Our earlier thought about these conditions, which was embodied in a separate project entitled "The Teacher in 1980," has now led to our conviction that a new role of the teacher must be created and that this new role should be the focus of the Center's program.

The nature of this central shift may be noted in our first major problem area, which we have termed "heuristic" teaching. As described in this report, this is teaching aimed at self-motivated and sustained inquiry, which emphasizes affective as well as cognitive processes, and places high premium upon the uniqueness of each pupil, teacher, and learning situation. The term heuristic connotes only a part of what we see emerging. But we have not yet been able to find a better single term for it.

The second problem area derives from our recognition that it is not enough to select promising young persons for entry into teaching, and train them well in a new role. Schools must be so organized and operated as to permit a new kind of teaching and learning to take place. There is abundant evidence that the schools as now organized and managed tend to discourage rather than foster the kind of teaching and learning here referred to.

Thus, the problem becomes that of unlocking schools so that pupils and teachers and materials for learning can be brought together in ways that take account of their many differences. The rigidities and standardizations that arose as we moved from a small and selective to a universal school system are now blocking progress toward new educational goals. These organizational constraints must now be cleared away. The problem, then, is to help to create a more "open" school in which new forms of teaching and learning may take place. We have some ideas, detailed in this report, about the nature of such open schools and how to bring them into being. Some such schools have already been partly created, and the Center intends to study these in embryo, to learn if they do indeed, as claimed, promote better teaching and learning, and how, if they do, we may hasten the process of creating large numbers of them. It should be recognized that these two problems are, namely, what we have termed heuristic teaching and the environment for teaching, and represent a metamorphosis of our previously defined behavioral and personological domain, on the one hand, and the institutional domain, on the other.

We propose, in the coming year, to begin work upon a third problem. No one aware of the issues and forces of our times can fail to be impressed by the urgent needs of that unfortunately large segment of our population known as the "disadvantaged." While they are represented in all segments of society and may be found in all places--in many ways, we are all disadvantaged, and all nations are in some ways underdeveloped--there are disproportionate numbers in the cities, in the slums, and among ethnic and cultural minority groups. It is alleged that so much is wrong with our cities, and so much wanting in the lives of the disadvantaged, that it would be foolhardy to blame the schools, or expect to reduce these problems. Surely, a full-scale effort of all parts of our society will be required to cope with these problems. There is promising evidence that the nation may be on the road to making this kind of commitment. Schools and education must do their full and indispensable part of the job. It is true that a good education becomes more and more essential if an individual is to live a satisfying personal life and to occupy a productive place in society. It is becoming more urgent also that a good education rather than resulting from an accident of birth will be a guaranteed right for everyone, so that all men obtain a satisfying place in society. It follows that we must have new, better, and probably quite different schools and teachers for the disadvantaged. In other words, special problems arise in teaching the disadvantaged, especially the poor, problems insufficiently considered so far. We are recognizing that a teacher needs special preparation for effective work with disadvantaged students.

These questions are urgent. Also, the staffs of the Center, the School of Education, and the University contain a number of persons highly competent and experienced in research and other work with urban education and disadvantaged groups. So we have decided to undertake a program in this problem area. Again, as with heuristic teaching, we are not fully satisfied with the nomenclature, teaching the disadvantaged. We intend, as may be noted in the report which follows, to take some highly unorthodox approaches in our exploratory year. In establishing a new type of teaching-learning laboratory in an urban ghetto, we will be concerned with promoting some of the involvement entailed in the heuristic teaching program and with creating the kind of open school entailed in the program on environment for teaching. It has been alleged, of course, that a more open school cannot be located in such a setting. Certainly, many schools in the ghettos are among the most highly organized and controlled. But we believe that the idea of a more open school as specified in the report below should be tried and studied.

We see these three problem areas as connected closely with one another and yet somewhat distinct. Some projects developing in the Center will lie solely within one of the problem areas and others, already emerging, will bear upon the concerns of more than one.

As we have been developing this exciting new formulation of the problem areas of the Center, we have also been bringing to a close a number of projects which do not fit into these new formulations. In this way, we can more fully commit our time and resources to the new program. The disposition of previous projects and their conclusion or integration into the new program will become clear as one reads the report.

In moving from the old program, classified by domains, to the new program, focussed on problems, each project has been scrutinized to determine whether it fits into the new program. A summary of actions taken by the Staff of the Center indicates that of a total of 19 projects which constituted the Center's program in FY 68, 12 will be concluded at the end of FY 68, or phased out by the end of FY 69. In 10 of the projects, the work will be integrated into one of the new program areas. In 3 instances, there is an overlap in which old projects were phased out, and new ones in the same area were developed but with different emphases.

C. PROGRAM SUMMARY AND PROJECTION

This major section of the Annual Report contains two subsections, one dealing with the research and programs of the past year, and the other dealing with those for the coming and subsequent years.

I. The Research and Development Programs in FY 1968

In this part are described the projects in the three major domains--behavioral, personological, and institutional--and also the facilities and research services that were active during the past year. Within each of the domains, the projects are summarized of their purposes, methods, and results.

A. The Behavioral Domain

In this domain are included the projects that deal with teachers, classroom behaviors, objectively denotable and observable, in the form of dependent or independent variables. As dependent variables, these behaviors are the subject of teacher training studies, and various training methods are the independent variables. As independent variables, these behaviors are related experimentally or correlationally to changes in pupil behavior, achievement, attitude, and the like.

1. Technical Skills of Teaching: General

Frederick J. McDonald

The Technical Skills of Teaching Project has the following purposes: one, to develop descriptions of teaching behaviors which are known to have specific pupil effects; two, to develop methods for training teachers to use these behaviors.

The Concept of Technical Skills

The concept of a technical skill of teaching is that of a pattern of specific teaching behaviors which are used in a variety of teaching situations, and to some degree independently of the nature of the subject matter and the specific characteristics of the students being taught. For example, a teacher engaged in a dialogue with a student about some item of content usually will request the student to clarify and amplify his thoughts. The teacher will also indicate to the student his reactions to the student's ideas. Each of these behaviors has been described as a technical skill, the former being called "probing" and the latter "reinforcing students' participatory behavior." The skill is defined in terms of the specific teacher behavior. For example, the skill of probing is described as follows: When a student asks a question, the teacher follows this question with one of his own which requests the student to amplify or clarify his response. Obviously, a teacher needs to decide when to use this skill. But the skill itself consists in linking the teacher's question to the pupil's response, and maintaining a dialogue consisting of such sequences of student response and teacher question. Similarly, the reinforcing skill, or informing students of the correctness of their responses by rewarding them, and also encouraging them to respond more frequently and consistently by rewarding for responding, is a generalized kind of teaching behavior applicable to a wide variety of situations.

Research Goals

The Technical Skills of Teaching Project develops descriptions of such behaviors and tests their use to determine what effect they have upon pupil behavior. The long-term goal of the project is to develop a set of skills related to a general conception of effective teaching. One of the major concerns of this project is to determine whether these teaching behaviors have the effect that they are expected to produce in pupils.

The second major concern of this project is to determine how to train teachers to use these skills. This research effort consists in conducting training experiments in which the dependent variables are specific technical skills which trainees are to learn, and the independent variables are various training procedures.

For example, this project has conducted a series of experiments in which two major kinds of variables have been systematically studied, variables related to modeling procedures, and variables related to feedback procedures. A typical experiment provides a description of the skill to be learned in the form of a presentation of a teacher enacting the behavior. The characteristics of this presentation are systematically varied, for example, by varying how the model portrays the behavior, or by varying the characteristics of the model, or by varying the student's exposure to the model. Similarly, the project utilizes videotape recordings of the trainee's performances as a mechanism for providing feedback. Whether and when feedback is provided, and the method by which it is provided, are some of the ways in which the feedback system is systematically varied. The long-term outcome of this research will be a description of training procedures that are effective in producing the learning of specific teaching behaviors.

Thus, this research project has as its major goal the description of ways of training teachers to perform certain classes of teaching behaviors which are known to have systematic pupil effects. Since such training is a major purpose of any teacher-training program, the rationale for this line of research is given in the nature of the goals of teacher training. We are conducting in a systematic way the kinds of experimentation which should provide basic methodological principles for teacher-training programs. In this respect, this project is perhaps remarkable in that it does not attempt to develop teacher-training procedures by speculating about what might be effective programs, and it does not represent a commitment to any particular belief systems about the nature of effective programs. Rather, the approach is an empirical one in which training methods which have demonstrated effectiveness are developed.

Theoretical Rationale

The use of the concept of technical skills does, however, require a rationale. The approach being used is a systems-development approach in principle. The first step has been to attempt to analyze the teaching task into a set of component actions. We have divided these actions into two broad categories: (a) the technical skills of teaching, which are the observable performance behaviors of teachers, and (b) professional decisions, which are the cognitive activities of teachers, complex processes by which a teacher determines at any given moment what teaching skill is required to achieve a specific teaching purpose.. This division is a heuristic device to make possible more precise definition of the problems of a systems-analysis approach.

A second heuristic device is that of using component-task analysis to analyze the parts of the teaching process and the decision-making process underlying it. Therefore, we select specific teaching skills which are assumed to be, and subsequently are shown to be, components of the whole complex of teaching activity. We then experiment with each of these components to achieve the purposes described above. When we have identified a set of technical skills with known effects, and have developed methods for training them, we move to the second level of analysis, in which these components are put together into a more complex action. Thus the approach is essentially pragmatic and analytic, similar to that used in any systems-analysis and systems-development activity.

Although no comprehensive conceptual scheme has been developed for analyzing teaching behavior and pupil effects, one conception of teaching style has dominated the selection of particular kinds of technical skills to develop. In the last Annual Report, the Center committed itself to analyzing and developing those teaching behaviors least likely to be reproducible by nonhuman means, such as texts, films, television and computers. We thought at that time that teaching behaviors which elicited complex cognitive processes would be among such teaching performances, not likely to be elicited by other media. Therefore, we have selected such technical skills as inquiring questions, analytic questions, and "higher order" questions. These types of teaching behaviors place emphasis upon the activity of the student. When a teacher utilizes such teaching behaviors, he must necessarily utilize what the student knows, guide rather than instruct the student, and generally lead the student to discover meanings and values for himself. Therefore, the implicit conception of teaching is one in which the teacher is seen as the stimulator of inquiry and the guide of self-directed activity, i.e., the "responsive environment" against which the student tests and evaluates his ideas.

Although this kind of teaching requires more than the teaching style which is characterized by the heuristic questioning above, this aspect of teaching behavior is a central feature of it. The way in which a teacher both stimulates a student's thinking, and responds to it when it is manifested, determines the kind of thinking in which a student will engage, how he will feel about himself as a problem solver, and the kinds of attitudes he will have about the problem-solving process itself. This component of a heuristic teaching-style is the means by which the student is engaged in meaningful, problem-solving activity; is encouraged in self-directed activity; and is provided with models of how to engage in some problem-solving activities. The teacher who is stimulating this kind of pupil behavior will engage in many other activities directed to achieving these effects on pupils. Such a teacher will be more imaginative and judicious in the selection of learning activities. He will be more likely to engage in tutorial and consultant-type relations with the student. He will be more likely to promote independent work on the part of his students.

Those technical skills most directly related to stimulating inquiring behavior within the context of a student-teacher dialogue have been emphasized. This kind of engagement between teacher and student will be central to other activities. Independent study, for example, will be a more effective way of developing a student's initiative, self-direction, and problem-solving capacities if the teacher interacts with the student in the course of the latter's work in such a way that he continually stimulates the student to inquire, to solve problems, to analyze the basis for his decisions.

Similarly, when a teacher begins to engage in teaching performances such as those described, he begins to see what he is teaching and his students in an entirely different light. Many teachers have been educated in the tradition of didactic teaching. They model themselves after the kinds of teachers to which they have been exposed. They themselves have had relatively little practice in inquiry activities. Consequently, to engage them in such activities, it is necessary to provide them with the means of interacting with students in a way relevant to inquiry. They need to learn the most basic elements of teaching performances which are inquiry-oriented. It is for this reason also that we have chosen to work with these component skills, with the long-term goal of developing sets and systems of such skills which are embedded in complex teaching activities.

In short, the goal has been to develop those technical skills most relevant to heuristic teaching, which is a kind of teaching that leads to the development of the inquiring student. The experiments are designed to find ways to train teachers to use these skills. Our conception of 'teaching' is that of an activity in which a human being engages another human being in the active search for understanding, meaning, and value in his experiences.

Research Strategies - Teacher Training

To achieve these goals, two principal kinds of strategies have been used. First, the Secondary Teacher Education Program was used as a field laboratory for testing methods of training teachers. In this program the investigators have tried a variety of procedures and activities to assess the problems that they engender in training teachers, the effects they are likely to have, and their feasibility. For example, we have used this program to develop a comprehensive rating system described below on pp. 71-75 . That work is related to the Technical Skills of Teaching Project in that it serves as a source of ideas on teaching behaviors and as a means for checking the meaningfulness of the kinds of behaviors being developed as technical skills.

Another example is the development of the series of seminars to individualize instruction in this program. Several of the Center staff have conducted these seminars. One seminar is designed to engage students in the inquiry process directly as the essential part of the seminar activity. Another seminar sensitizes the interns to the way in which they are interacting in groups. A third seminar has been primarily a group-counseling activity. Each of these seminars has provided a rich body of data about teacher-education trainees. It has enabled us to assess more accurately the reaction of trainees to the technical-skills training and to uncover problems which this line of research has not yet attacked.

A third example of the way in which the teacher education program is used is that of introducing new arrangements in the program. Thus, the development of performance criteria for foreign-language teachers led to a set of training activities designed to bring foreign-language teachers to the performance levels established in these criteria.

A fourth way in which the program serves as a resource is the system of video-tape recordings that is routinely provided as part of the program. These recordings provide behavioral observations of the teaching of the interns who have been trained to use various technical skills. These observations are used to assess the degree to which the skills are being used and to provide bases for discussions with the interns on the ways in which the learning of the skills has affected their teaching.

Research Strategies - Experimental Studies

The second attack on the training of teachers to use technical skills has been to conduct a series of experiments in which certain variables were systematically varied. Two broad categories of variables have been manipulated. The first is the demonstration component of the training. Usually this component is mediated in two ways: (a) by giving sets of instructions, and (b) by providing videotape or film models of the teaching performance. Various combinations of instructions in modeling are tested to assess the extent to which a set of instructions, for example, is sufficient to guide learning of the technical skill. Characteristics of the model performance are also varied.

The second category of variables manipulated is the conditions of practice. These variables are manipulated by (a) having the trainee teach either a pre-set lesson or one of his own choosing, and (b) by varying the amount and timing of practice.

The third category of variables is the feedback arrangement. The ordinary training procedure is to videotape all teaching performances. These videotapes are then played back to trainees. The trainee may view these tapes alone, or with an experimenter-supervisor who directs his attention to certain aspects of the performance. The way in which the trainee is cued to look at his behavior is systematically varied to find the most effective procedure.

Over a two-year period we have conducted a set of experiments designed to find which combinations of these variables are most likely to produce changes in the dependent variable, i.e., the technical skill being learned. These experiments have been useful in identifying what variables could be used to build more complex training strategies.

Experimental Results - Higher Order Questioning

In one experiment, a trainee was exposed to either a written description (symbolic modeling) or to a videotaped model of a teaching performance (perceptual modeling); he then taught either his own lesson or the same lesson that the model taught; the model (symbolic or perceptual) showed only positive instances of behavior being learned, or the model contained both instances and non-instances of the behavior being learned. This experiment was conducted in the previous reporting period. During this present period, the data have been re-analyzed, and new interpretations of the results have been developed.

The experiment was designed to answer the following questions: First, with complex verbal material and complex performances being learned, as in this experiment, which is the more effective learning procedure -- reading a written description of the behavior or simply watching an individual enact the behavior? The dependent variable in this experiment, higher-order questioning, required complex cognitive activity on the part of the teacher. It may be that the thinking processes associated with producing questions are more likely to be stimulated by reading through a transcript of a class in which the teacher asks these kinds of questions. Reading a transcript permits time for thought, permits review of material, and is essentially a self-paced kind of activity. The behavior is essentially an interaction performance requiring the teacher to be responsive to the content of students' answers. On the other hand, watching a teacher enact these behaviors may stimulate thinking about the process in a way which reading the written materials would not.

Second, providing instances and non-instances of the desired behavior sets the necessary conditions for discrimination training. Is the behavior more easily learned with this kind of discrimination training or with exposure only to positive instances of the desired behavior?

Third, is the behavior more easily learned if one uses exactly the same lesson as the model, or generates a lesson of his own? In the former case, we are more likely to see instances of the performance behaviors, since the trainee can imitate the behavior of the model. In the latter case, the trainee may learn more by having to generate his own high-order questions.

In this experiment,the training conditions did produce significant shifts in the behavior to be learned in all groups. The least effective condition was that in which a trainee taught his own lesson, having been exposed to the perceptual model demonstrating both instances and non-instances of the desired behavior. On the first training trial, the most effective condition was one in which the trainee viewed a perceptual model providing only positive instances of the desired behavior, and taught the same lesson as the model. On the second training trial, the most effective condition again was a perceptual modeling condition in which the trainee observed both instances and non-instances of the desired behavior, and taught the same lesson as the model. Thus it seems clear that, for initial learning, a relevant strategy is to show a model performing the behavior, but with no non-instances of the behavior in the model tape. A second learning trial then introduced discrimination training.

The fourth trial was a transfer trial, in which subjects now taught a different lesson from the one they had taught in previous training trials. Performance dropped off markedly in this condition. The conditions which were most effective on this trial were those in which a model demonstrated only positive instances of the behavior.

This study also revealed significant interactions between the kind of lesson taught and the type of model to which the trainee is exposed. It appears that two kinds of training conditions are likely to be most effective: (a) a combination of perceptual modeling, positive instances only, followed by teaching of the same lesson as that demonstrated; (b) symbolic modeling with instances and non-instances of the desired behavior followed by teaching one's own lesson.

The results of this experiment illustrate how this experimental work leads to decisions about training strategies. For example, two kinds of strategies can be combined on the basis of the results of this experiment. It seems clear that for initial learning the most effective treatment is a videotaped demonstration of the desired behavior containing only instances of the behavior followed by a practice situation in which the trainee teaches the same lesson as the model. Then, this training probably should be followed by analysis of the written model containing both instances and non-instances, followed by practice on one's own lesson. The utility of this strategy can be tested quite directly by conducting a training experiment in which some subjects follow this combined strategy and others receive the same amount of training with either a perceptual modeling strategy or a symbolic modeling strategy.

Experimental Results - Inquiry Questioning

Following the same line of work, the investigators conducted another experiment in which, for the first time, the modeling procedures were used directly to stimulate problem-solving behavior on the part of the trainees. The dependent variable in this experiment was inquiry questioning, in which the trainee learned a questioning strategy designed to stimulate inquiry behavior on the part of the pupil. These inquiry questions are a variation on the broader category called "higher-order questions" in which a specific procedure is used to direct the student's thinking toward the goal of enabling him to use the elements of the inquiry process. In this experiment, two basic kinds of models were used: (a) teachers modeling the behavior, and (b) the student's response. In the latter condition, the trainees viewed the student's performance and were asked to indicate what kind of questions the teacher had asked in order to generate the kind of answer they had observed. Another variation on the modeling was to provide either positive or negative instances of the behavior. For example, the teacher asked either inquiry-stimulating questions or lower-order fact-eliciting questions. In the student-model conditions, the student responded either at a higher level or at the factual level.

The trainees observed the model on one occasion, then participated in a 30-minute teaching session. Such a longer teaching session was considered necessary to permit the trainee to practice all of the behaviors which he was being encouraged to learn.

The results of this experiment suggested that the student models were more likely to be effective than the teaching models when the student models were used to generate thinking about the teaching behavior. Unfortunately, because of the relatively large number of groups used in the experimental design (nine), the number of subjects per treatment condition was comparatively small, and the results merely approached statistical significance. The obtained results are sufficiently intriguing and consistent to call for investigations of the effects of viewing student behavior in contrast to viewing teacher performance. Again, the goal is to arrive at a decision rule for selecting a particular kind of model for a given training objective. It should also be noted here that the positive instances were again more effective than negative instances, a result consistently obtained.

The latter conclusion illustrates the way in which this research program has tested common conceptions about effective training procedures. Many instructors believe that both positive and negative instances of a desired teaching behavior should be used. Thus the trainee should learn both what to do and what not to do, and thus will more clearly understand the nature of the behavior being learned. When one attempts to construct a negative model, he finds that this approach does not always make sense; that is, a negative instance of a teaching behavior is quite frequently merely the absence of that behavior. In higher-order questioning behavior, however, the negative instance consists of factual questions. In this experiment, and in related work, it is clear that providing negative instances is not an effective training in strategy itself. Only when negative instances or non-instances of the desired behavior can be used in a discrimination-training strategy are such instances effective. Our results seem to accord with a vast body of psychological literature that encourages instructors and other mediating learning processes to avoid inducing learning by indirect means, except when such learning can be linked to ways of finding the patterns of the behavior to be learned.

Experimental Results - Modeling and Feedback Techniques

Another line of work has led us to investigate the importance of cueing the trainee when he watches the videotape of the performance of either a model or himself. The effectiveness of some of our model tapes had been disappointing. It was conceivable that their effectiveness was being attenuated by the complexity of the behavior being watched. These tapes showed complex teaching performances in which a teacher, in conducting a lesson, enacted many different kinds of behavior. Unless a viewer was cued to the specific kinds of behavior to be learned, he might very well attend to other behaviors which he found interesting.

Similarly, during the feedback period, does a trainee need to have his attention called to the instances being learned? In our first experiment, we found that the most effective condition was one in which the trainee did have the services of an experimenter who cued him whenever the trainee performed the desired behavior and also whenever he could have enacted this behavior. In that experiment, however, no modeling procedures had been used.

These results led us to raise the following questions: (a) To what extent does cueing facilitate learning from models? (b) If such cueing is provided, does cueing during the feedback process enhance the learning? An experiment was designed to answer these questions. Subjects were randomly assigned to one of four treatments. In the first treatment they were cued while viewing a model, and during their feedback period; in the second treatment, they were cued while viewing a model but not during their feedback sessions; in the third treatment, they were not cued while viewing a model, but were cued while viewing their own performance; in the fourth treatment, trainees were not cued during either the modeling or the feedback sessions.

The behavior being learned was higher order questioning. In this study we had developed a system in which higher order questions were broken down into several categories including such kinds of higher order questions as translation questions, interpretation questions, application questions, analyses questions, evaluation questions, etc. The categories were derived from The Taxonomy of Educational Objectives.*

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* B. S. Bloom (Ed.) The Taxonomy of Educational Objectives: Handbook 1; Cognitive Domain. New York: Daniel McKay Co., 1956.

The results of this experiment clearly indicated that trainees who had been cued during modeling sessions learned the desired behavior to a greater degree than trainees who did not receive this cueing. Further, cueing during the feedback session added nothing to the improvement in performance. We are presently trying to determine the influence of the feedback in these training sessions.

Again, this experiment leads to a hypothesis about training strategies. It appears that when effective cueing can be provided during a modeling session, it is not necessary to add this component to the feedback session. In the first experiment, self-viewing with no experimenter present was a very ineffective training condition. It is now known why it was ineffective. It appears that the trainee in viewing the behavior has no idea of what to look for; however, if he has some clear idea of what to look for by having viewed another person's tape with cueing, he probably can view his own tape without such assistance. In other words, the comparison processes have been generated by viewing the model.

Application of Experimental Results to Training

The practical implications of this conclusion are clear. Using experimenter-supervisors during both modeling and feedback sessions is expensive. Eliminating the need for them during one set of sessions reduces costs considerably.

As the above experimental work makes clear, we are beginning to determine the kinds of training strategies most likely to be effective. It can be stated with some confidence that initial learning probably should be produced through a heavy emphasis on modeling, where the modeling sessions involve presenting positive instances of the desired behavior. Probably only one or two practice sessions are necessary in order to achieve a marked increase in such complex behavior as asking higher-order questions. This initial learning should be followed by training sessions in which the trainee is exposed to a variety of models illustrating both instances and non-instances of the desired behavior in order to facilitate discrimination training. These kinds of sessions should be followed by practice sessions in which the trainee attempts to enact the behavior in more complex ways, by generating lessons of his own. The first kind of training session possibly requires only modeling sessions in which the trainee is cued on the appropriate behaviors. We suspect that the second kind of session probably will require feedback strategies.

To maintain the behavior in actual teaching, it probably is necessary to use only feedback strategies. Thus, we can organize learning into two stages: In the initial stage the trainee is exposed to models extensively, practices the behavior in relatively short periods of time, as in microteaching sessions. He progresses to more independent work with feedback on his teaching performance. These kinds of training sessions, if conducted during the summer, prior to a year of teaching experience, bring the trainee to the point where he knows what the desired behaviors are and can enact them effectively. During actual teaching in classrooms, successive viewings of his videotape performance should be sufficient to maintain the behavior in strength.

One major contribution of the Technical Skills Project is to develop paradigms for training. The investigators expect to be able to specify the kinds of conditions under which particular kinds of behaviors can be learned. Then, too, it is expected that these statements about relationship between training variables and trainee learning can be developed into a model of training paradigms. As can be seen, considerable progress has been made in the direction of this goal.

Studies of Training - Skill Interactions

Another line of work has been developed in the past year. We have been concerned about the interaction between training-method and the skill being learned. It became apparent, as we conducted the experiments which have been described, that some kinds of behaviors appeared to be learned more readily with symbolic treatments and others with perceptual modeling treatments. No experiment, however, had compared the treatments for different behaviors. Therefore, we designed two comprehensive experiments, one at Stanford University, the other at San Jose State College. In the experiment conducted at Stanford three types of training conditions were used: (a) symbolic modeling in which the trainee received a written description of the desired behavior, where the description consisted in the transcript of a lesson; (b) perceptual modeling in which the trainees viewed the actual videotape of the same lesson for which the trainees in the first condition received a transcript; (c) a brief written description, which the trainee read, and then feedback, with an experimenter present, on their teaching performance.

Trainees were randomly assigned to one of these three conditions, and in successive days learned three different technical skills (reinforcing students for participating in class discussion, probing, and using silence and nonverbal cues to stimulate discussion). The data gathered in this experiment were so extensive that we are just now beginning to get preliminary results. We are not yet able to assess the interaction between treatments and skills. A preliminary analysis indicates, however, that for the skill of probing there appear to be no treatment effects. Some treatment effects and perhaps interaction effects are expected for the other skills.

The San Jose State College experiment used treatments described previously, namely, modeling with and without an experimenter present, and feedback with and without an experimenter present. This design was maintained across the learning of three skills (higher-order questions, the use of silence and nonverbal cues to stimulate class discussion, and reinforcing students for participating in class discussion). Thus, the effectiveness of the treatments will be tested across the learning of three different skills. The only results available on this experiment are those already described; modeling, with cueing, was the most effective treatment variable when the behavior being learned was the use of higher-order questions.

Aptitude - Treatment Interaction Studies

Finally, we have begun a line of investigation to study the relations between the characteristics of our trainees and the effects of the kinds of treatments to which they are exposed. We have observed, in many of our experiments, what appear to be differential reactions to treatment. Some of these reactions are positive and negative emotional reactions. Subjects also seemed to have different information-processing capacities as they viewed model or feedback videotapes.

Two studies are in progress to determine in what ways information-processing capacities interact with the kinds of treatments that are used in the experimental series described. In one study, training methods have been devised to increase trainees' attention to a wide variety of cues and stimulus materials and to the task of generating alternative explanations for the phenomena which they observed. Trainees are to be exposed to structured and unstructured film sequences. It is predicted that the unstructured films will produce more hypothesis generation, while the structured films will produce more attention to cues. This study is an initial exploration of training procedures to determine what kinds of stimulus materials are necessary to produce attending-and-hypothesis-generating behaviors in teachers.

The second study exposes trainees to two kinds of models, perceptual and symbolic. Trainees are to be given tests of aptitude and perceptual abilities. It is predicted that trainees who have higher scores on measures of perceptual ability will learn more from the perceptual modeling treatment, and trainees who have higher scores in verbal ability will learn more from symbolic modeling treatments. If these predictions are supported by the data, they will lead to important modifications in our training procedures. Trainees will be assigned to particular kinds of treatment on the basis of abilities most relevant to profiting from the treatments. This research will also open up a new line of investigation, in which aptitude variables are systematically related to treatment variables.

The experimental work described in the preceding pages was conducted in large part within the training program for interns during the summer preceding their year of internship. At Stanford, three technical skills were learned in the same treatments. At San Jose, four such skills were learned in the same treatments. This consistency of treatment will give us some idea as to the utility of these treatments in the basic design of one part of the Teacher Education Program. We have also been able to follow up these interns--though not as extensively as we had originally planned--and can determine the degree to which what had been learned in the summer was still being utilized in their teaching, and in what ways it had been modified, or adapted to a personal style.

Developmental Work

As noted previously, one major product of this project is the development of training paradigms, the testing of these paradigms, the promulgation of these models, and suggestions for their use.

The project also produced a film "The Technical Skills of Teaching." In this film the concept of technical skills is explained, and three technical skills are illustrated by a model demonstrating the skills. The film has been shown to a large number of people and has met with favorable reception. It is now in the "print" stage and will be available for widespread distribution shortly. It is also planned to use the film in training, since it illustrates the basic concepts around which a training program is built.

Dissemination Activities

Dr. McDonald presented the following papers and participated in the conference activities indicated:

June 1967	Southern Illinois Univ.	"Technical Skills of Teaching: Research and a Theory" "The Teacher in 1980: Changing Styles of Instruction"
July 1967	Stanford University Microteaching conference	"Microteaching"
Dec. 1967	University of California at Los Angeles Symposium on Theory of Evaluation	Led open discussion on "Instructional Variables"
	Stanford University Conference, Northern Section State Jr. High Principals	"The Improvement in Teaching"
Feb. 1968	American Educational Research Association meeting	"Model of Mathemagenic Behaviors as Intervening Variables" "Training Teachers as a Research Tool"

A final report on an earlier project was completed:

McDonald, Frederick J. and Allen, Dwight W. Training Effects of Feedback and Modeling Procedures on Teaching Performance, Final Report, 1967, School of Education, Stanford University, Contract No. OE-6-10-078, U. S. Office of Education.

2. Technical Skills of Teaching: Explaining

N. L. Gage

This project and its sub-projects have been concerned with various aspects of the "effectiveness" of teachers in presenting explanations or lectures to their classes. The project is based on the assumption that this aspect of the teacher's role will continue to have some significance despite the increased use of various media other than the teacher (television, programmed instruction, films, etc.) for the didactic parts of the task of engendering knowledge and understanding in learners.

During the past year, four studies were completed and two new ones have been planned. The four completed studies, which were presented in a symposium on the "Teacher's Explaining Behavior" at the meetings of the American Educational Research Association in February 1968, are based on the same set of data. These data consist of videotape recordings of two 15-minute explanations presented to their classes by 45 twelfth-grade social studies teachers on two successive days. After each explanation, the class took a ten-item test of comprehension of the main ideas in the article on which the lecture was based. On a third day, the pupils in all classes listened to a tape-recorded lecture on a third article and took a ten-item test based on it. Also, the students rated their teacher's explanation on a 12-item rating scale and also reported on the degree to which they paid attention during the explanation.

Generality and Correlates in Students' Ratings and Attention

The first study, "Evidence on the Generality and Correlates of the

Teacher's Ability to Explain," by Maria Podlogar, N. L. Gage, and Barak Rosenshine, dealt with the degree to which the teacher's effectiveness--measured by the mean score of his students adjusted for student ability and the teacher's "content relevance"--correlated from one lesson to the other. By a conservative estimate, this generality--based on the correlation between the adjusted mean score of the odd-numbered students on one lesson with the adjusted mean score of the even-numbered students on the second lesson presented the next day--was about .45. The mean ratings of their teacher's performance by his students was similarly adjusted in terms of the mean ratings by the class of the third (tape-recorded) lecture in order to control for overall rating tendencies. These mean ratings also correlated meaningfully with the adjusted effectiveness of the teacher. The corrected correlations between effectiveness and adjusted mean ratings of "clarity of aims," "clarity of presentation," "pupil participation and attention," and "amount of learning" were between .40 and .50. In short, on the question of generality, it appeared that the teacher's ability to explain does not depend entirely on the particular lesson being taught on a particular day to a particular group of students. On the question of rated correlates, it appears that students' ratings of various dimensions of their teacher's performance correlate substantially with how much they learned from that performance.

Modality and Validity of Cues

The second study, "The Modality and Validity of Cues to Lecture Effectiveness," by W. R. Unruh, dealt with two questions: (1) What type of protocol, or record of behavior, is the most valid source of cues for rating teacher effectiveness? (2) What are the perceived correlates of effective explaining behavior? The first question was investigated by presenting raters (high school students) with recorded teacher behavior in seven different forms: (a) typewritten transcripts, (b) audiotapes, (c) videotapes, (d) transcripts plus audiotapes, (e) transcripts plus videotapes, (f) audiotapes plus videotapes, (h) transcripts plus audiotapes plus videotapes. The raters were asked to rate, without ties, each of four lectures on a ten-point scale representing the mean score on an achievement test as predicted by the rater. The rater was also given a copy of the lesson and of the test used by the teachers. Separate sets of eight raters were used for each of the seven sets of protocols on each of the two lessons. Thus, there were 112 (8 x 7 x 2) raters. Results indicated that the audio plus video protocols provided the most valid cues because the ratings of the group of raters that received this protocol correlated highest with adjusted effectiveness means for both the Yugoslavia lecture (r = .6) and the Thailand lecture (r = .7), while the median correlation coefficient for all other protocols was either negative or near zero. An additional 60 raters working only with the audio plus video protocols then rated the four explanations on Yugoslavia and Thailand on a series of fixed-alternative and free-response devices. Here the purpose was to determine the perceptually or subjectively determinable correlates of explaining effectiveness. On the free-response device, the most important correlates appeared to be teacher preparation and presentation, the cognitive level of the presentation, use of an outline, and coverage of the material. Responses relating to personality variables and vocal quality did not discriminate. On the fixed-response device, the correlates of effectiveness were skill in presenting the material, making the content clear, knowledge of the subject matter, and quality of planning. These results make sense in view of the cognitive nature of the criterion of effectiveness. They should be useful in the search for less subjective and perceptual, i.e., more objective and behavioral, correlates of effectiveness.

Objectively Measured Behavioral Predictors

The third study, "Objectively Measured Behavioral Predictors of Effectiveness in Explaining," by Barak Rosenshine, used five high-scoring and five low-scoring teachers, as measured by their students' adjusted mean achievement scores on the achievement tests on Yugoslavia, as a "hypothesis sample." Another five high-scoring and five low-scoring teachers on the Yugoslavia lesson comprised a "validation sample." And five most and five least effective teachers in explaining the material on Thailand served as a "cross-validation sample." Relationships with effectiveness were determined in the hypothesis sample for 72 single variables which were measured by a total of 142 different indices. Those indices that discriminated at the .15 level in this sample were then subjected to an analysis of variance in the combined hypothesis, validation, and cross-validation samples (N = 30). The variables fell into linguistic, instructional set, presentational, and naturalistic categories. Of the variables studied, 21 occurred with sufficient frequency to merit counting and could be reliably counted. Of the 21, ten discriminated between the high and low groups in the hypothesis sample. Of the ten, three discriminated between the high and low groups across the three samples. These three were (a) rule-and-example pattern, (b) explaining links, and (c) gesture and movement. The rule-eg-rule pattern was found significantly more frequently in the high-effectiveness teachers; the rule-eg and eg-rule patterns were found more frequently in the low-effectiveness teachers. This finding suggests that neither an inductive nor a deductive organization is as effective as a combination of both. But the usefulness of this finding in the analytic study of spoken prose is questionable because it is difficult to distinguish between examples and rules without the assistance of the original, printed article on which the explanations were based. Explaining links consisted of prepositional phrases and conjunctions, such as because, therefore, in order to, consequently, by means of, since, by, and so, that link phrases either within or between sentences so as to elaborate or expand upon another phrase or sentence. This special linkage may be illustrated by the following three sentences, which are almost identical:

1. The Chinese dominate Bangkok's economy, and they are a threat.
2. The Chinese dominate Bangkok's economy, but they are a threat.
3. The Chinese dominate Bangkok's economy; therefore, they are a threat.

The third sentence may be easiest to comprehend because it contains the explaining link, "therefore," instead of other words such as "and" or "but." Different types of explaining links also seem to be interchangeable, as in the following three examples:

1. The Chinese dominate Bangkok's economy; therefore, they are a threat.
2. The Chinese are a threat because they dominate Bangkok's economy.

3. By dominating Bangkok's economy, the Chinese are a threat. Apparently, explaining links improve the explaining process, defined as showing the relationship between objects, events, principles, or statements reporting either cause or effect or comparison and contrast. Gestures and movement--defined as movements of the arm, head, or trunk, and movement from one fixed place to another--were significantly more frequent per minute and per hundred words in the more effective explanations.

Computer Analysis of Explanations

The fourth study, "Computer Analysis of Teachers' Explanations," by Daryl Dell and Jack Hiller, subjected the transcribed protocols of the teachers' explanations to frequency counts, by means of an electric computer, of various kinds of words. The count is made with a dictionary look-up procedure, whereby the text words are coded with information representing the investigator's theoretical orientation. The computer gave such content analyses a degree of reliability, objectivity, speed, and economy that would otherwise be unattainable. One dictionary was that for "vagueness,"--words that individuals tend to use when they are vague, that is, not precise. Examples of such words are almost, generally, many, maybe, and most. It was hypothesized that poor explainers use these words with greater proportionate frequency. In a random sample of ten of the 45 transcripts of Yugoslavia presentations, the "vagueness" total correlated -.88 with effectiveness. Additional dictionaries investigated were the Harvard Third Psycho-Sociological Dictionary, an expanded "vagueness" dictionary, an "adherence-to-detail" dictionary, Holsti's semantic differential dictionary, and the Dale List of the 3,000 most commonly used words. Many of the dictionaries overlapped in word content, but the total word list contained approximately 7,000 words. A random sample of 15 protocols from the Yugoslavia group and 15 from the Thailand group containing only teachers not represented in the Yugoslavia group was used to determine the correlations with effectiveness of these various dictionaries. The Holsti approach had little value. An expanded "vagueness" dictionary correlated -.59 and -.48 with effectiveness on Yugoslavia and Thailand, respectively; both _r_s are significant at the .02 level. This dictionary includes simple phrases as well as single words. Vagueness on the Yugoslavia protocol correlated .84 with that on the Thailand protocol for the 23 teachers in both groups. An explaining-links dictionary based on Rosenshine's study correlated .38 and .37 with effectiveness in the Yugoslavia and Thailand groups, respectively. In general, this study supports the conclusions that computer procedures can be developed for analyzing certain aspects of classroom discourse, that vagueness as counted by the computer correlates negatively with effectiveness in explaining, that vagueness is highly reliable on a "test-retest" basis for the teachers in this study, and that explaining links correlate consistently from one sample to the next.

Two New Studies

The two new studies have been planned by Robert Pinney and Robert Shutes under the direction of N. L. Gage. These studies will be based on data from the Intern Data Bank described elsewhere in this Annual Report. Using samples of entering interns before and after a summer's training in the Stanford Secondary Teacher Education Program, these studies will determine correlates of effectiveness on the part of the interns. Pinney's study will be concerned with "presentational" variables as ascertainable from the videotape recordings of the interns' behavior in two 45-minute teaching exercises, one at the beginning and the other at the end of the summer's training. The other study, by Shutes, will be concerned with variables measurable in the transcriptions of the texts of the 45-minute lessons, in which each of the interns taught a pre-set lesson to his class of about 23 high school-age boys and girls employed to serve as students in the training-research program. As of this writing, the data have, of course, been collected as part of the Intern Data Bank and the analysis is about to begin. It is anticipated that these investigations will yield some evidence relevant to the conclusions based on the four studies described above.

A Symposium at the AERA Meetings

At the meetings of the American Educational Research Association in February 1968, the four papers summarized above were discussed by Drs. John B. Carroll and Robert Glaser. Space limitations preclude full presentation of their comments, some of which dealt critically with aspects of the methodology and interpretation of these studies. But the following introductory remarks by Dr. Carroll merit quotation:

> I can't say too strongly that I want to commend Gage and his colleagues for undertaking this program of research. It's a kind of research that we have waited for for a long time, too long in fact for it goes right to the center of the teaching process conceived as the communication of knowledge. Some critics, of course, would be tempted to argue that lecturing is not a central element in teaching, or even if it is, that it should not be. I would defend Gage and his colleagues against this argument on two grounds: (1) lecturing

> is here to stay whether it's desirable or not, and actually there's not a great deal of convincing evidence against lecturing, and (2) even if straight monologue exposition by teachers is not or should not be a customary practice in teaching, there is certainly an element of verbal exposition in almost any live teacher-pupil interaction, whether or not it is a part of a dialogue between teachers and pupils that includes questions and answers or other repartee. Therefore verbal exposition merits study, and one way to study it is to look at it in concentrated doses, that is, in teachers' lectures. Just why there should be so much reaction by some people to the idea of lecturing I fail to understand--telling people things, telling stories, explaining things, etc. is a characteristic activity of the human species. Apparently what we don't like about lectures is the peculiar form of verbal behavior that sometimes occurs when people get up on platforms. I assume that Gage and company's teachers were not lecturing from platforms.

A chapter on these four studies and the comments of the discussants is being prepared by Dr. Ian Westbury of the Ontario Institute for Studies in Education for inclusion in a volume tentatively entitled "Research into Classroom Processes" to be published by the Ontario Institute and also by the Teachers College Press of Columbia University.

3. Technical Skills of Teaching: Languages

R. L. Politzer

The purpose of the project is to improve foreign language instruction by improving the training of foreign language teachers in two complementary ways: (a) by producing materials and programs to train foreign language teachers and instruments to evaluate foreign language teachers (developmental activities) and (b) by studying characteristic classroom behaviors of good and poor language teachers and the identification of good language teachers in terms of their effects on pupils (research activities).

The method of the project is one of development (partly based on research) followed by research and verification. Thus the staff began by producing materials and syllabi for the training of foreign language teachers (Technical Reports 1, 1A, and 2, 1966, 1967). The procedures outlined in these reports were based on the general research on microteaching and modeling. These reports also contained tentative guides for the evaluation of foreign language teachers. The subsequent phase of the project establishes the reliability of the rating instruments and, above all, their validity in terms of the study of the effects of teachers on pupil attitude and achievement. The main strategy used in the validation study consists in correlating attitude changes (over periodsof four to eight months) and pupil achievement (measured at the end of the semester or school year) with teaching behaviors observed in 15-minute segments of teaching performance (four 15-minute segments for each of the 20 teachers involved in the study).

As of April 1967, the training syllabus for teachers of Spanish was nearing completion. Some data for a pilot study concerning the correlations between change of pupil attitudes toward foreign languages, the subject matter competence of their teachers, and evaluations of their teaching performance had been gathered.

The training syllabus for teachers of Spanish was completed in May 1967, in time for use in various NDEA Institutes concerned with the retraining of teachers of Spanish. The pilot study dealing with the change of pupil attitudes yielded the somewhat disturbing result that teachers who rated highly in the performance of certain skills tended to have a negative effect on pupil attitude toward the subject. The findings of the study were reported in Research Memorandum No. 13; An Exploratory Study of the Relations of Teacher Competence and Performance to Pupil Attitudes Toward Foreign Language Learning, October 1967.

During the period September 1967 - January 1968, videotapes were made of four 15-minute segments of the teaching performance of 20 French teachers all teaching the same course (first year audio-lingual French). The pupils were given pretests of attitude and aptitude in September 1967. In February 1968, criterion measures of speaking, listening, writing in French were administered to all pupils. In December 1967, work was started to establish the reliability of a rating instrument that would distinguish creative language teaching from a non-creative approach. As of April 1968, the work of scoring the criterion measures is being completed. Upon completion of the grading of all instruments, it will be possible to rank the participating teachers in terms of adjusted measures of achievement by their pupils. The data on the performances and behaviors of the five highest and five lowest ranking teachers will then be subjected to detailed analysis.

The main dissemination activities of the project included the publication of the technical reports, which were distributed to all directors of NDEA Foreign Language Teacher Training Institutes and to all state and major county and city supervisors of foreign language instruction. In addition, the principal investigator, Professor Robert L. Politzer, reported on his activities to a meeting of the Modern Language Assocation of America, in the section on Audio-Visuals in Teacher Training, December 28, 1968, presenting a paper on "Microteaching."

4. Technical Skills of Teaching: Social Studies

R. E. Gross

The original purpose of the videotape aspect of this developmental project was that of collecting and developing materials. This purpose was broadened during the past year to include using and evaluating videotapes as a teaching device. Beginning in the Summer Quarter, videotapes were used in conjunction with the social studies teacher methods course whenever applicable. Feedback from the interns concerning the value of these videotapes has produced the following information: (a) it is relevant to watch actual teachers performing certain types of behaviors after the interns have discussed these behaviors in class; (b) videotapes depicting typical intern teachers are most meaningful to the interns; and (c) observing different styles of teaching provides both new approaches and additional insights into the complexity of the teaching situation for the interns. The staff has been encouraged by the positive comments about the use of videotapes as a supplemental teaching device. The major problem of unsatisfactory audio reproduction can be solved by purchasing and distributing individual microphones to pupils in the class being videotaped.

The staff continues to collect additional tapes as opportunities occur, especially looking for contrasting examples within its behavior categories, since many categories have already been represented by at least one or two tapes. Evaluation, in terms of the effectiveness and quality of the tapes, will continue during the remainder of the present year.

The Social Studies Teacher Appraisal Guide has been completed since the last Annual Report. The emphasis has shifted during the past year from development to refinement and use of the instrument. Having made extensive revision during the Summer and Fall Quarters, the staff is preparing a plan for a field study for the Spring Quarter. The instrument has already been used both in the school setting and in a small pilot situation. Initial results are quite encouraging in terms of rater agreement on various categories and on overall evaluation. The proposed field study would place this instrument in use with all 50 of the social studies interns for an entire quarter. The instrument would then be evaluated by the intern supervisors, resident teachers, and the interns. Various questions concerning the Appraisal Guide, including its applicability, completeness, relevance, etc., would be asked.

Copies of some of the videotapes have been prepared for local school systems in California and Oregon and for the Staff College of the U. S. Army Civil Defense School. Reports from all of these institutions have been quite favorable. A sample tape and an accompanying address concerning the use of videotapes in teacher education were presented at the National Council for the Social Studies convention in Seattle in November 1967. A similar presentation has been requested and approved for the State meeting of the California Council for the Social Studies in March 1968. Articles describing the use of the videotapes in the preparation of social studies teachers appeared in the September 1967 issue of Educational Screen and AudioVisual Guide and in the November-December 1967 issue of Education. A school district in Northern California sent several members of its staff to the Center to investigate the possibility of using the project's tapes, or copies, within their own school television system for in-service education purposes. In addition, various organizations, including other colleges and universities and churches, have expressed interest and have requested information concerning this videotape collection program.

Although it has not been extensively used in the field as yet, many requests for copies of the Appraisal Guide have been received, primarily from social studies teacher educators. As the Appraisal Guide is developed and used more extensively, those who request copies will be invited to recommend revisions in the instrument.

5. Role-playing: Its Uses in Teaching Decision-Making Skills

F. R. Shaftel and R. H. Koff

The general purpose of this project is to examine cognitive and affective dimensions of individual differences as correlates of the impact of role-playing in the classroom. Role-playing is one of the many alternatives available to the teacher for involving students in inquiry. In the present research, role-playing is viewed as an educational treatment. The major focus of the investigation was directed toward understanding the impact of role-playing upon the cognitive and affective life of the learner. A secondary goal was that of understanding the implications of the research on role-playing for the training of teachers.

As an inquiry process, role-playing requires of the teacher skills that have not been involved in conventional modes of teaching. Essentially an heuristic mode, it requires a classroom climate in which it is "safe" for students to take risks. The teacher must know when and how to (1) structure the role-playing situation; (2) be non-directive, (3) facilitate the flow of student ideas and (4) mediate group ideas. Such procedures demand skills in asking open-ended questions, listening for meanings, and asking clarifying questions. The students in this process learn the skills of listening, interacting with the ideas of others, objectifying one's own ideas, cooperating in active explorations, and engaging in antecedent-consequent thinking, especially in terms of sensitivity to the effects of one's behavior on others.

The present research was designed to determine what personal characteristics were influenced by the role-playing techniques used. A second objective was to develop procedures for facilitating the use of role-playing in the classroom; inevitably, this second concern involves the training of teachers and an assessment of the social environment in which role-playing takes place.

Two cognitive variables and one affective dimension were dealt with. The cognitive variables were ability to generate alternatives to problem situations and ability to think about future events that might be a consequence of one's behavior in a given situation. Guilford terms the latter behavior "antecedent-consequent thinking" and has developed instruments to operationalize this construct. The affective variable is "sensitivity to others." This term is operationalized by asking children to place themselves in the role of another child and say how the other child feels.

The Experiment

In an experiment involving four experimental sixth-grade classes and four control classes, the project has studied cognitive and affective aspects of role-playing interpersonal and intragroup relations. Instruments were designed or adapted to serve the project's purposes and were administered in a pre- and posttest design. The data have been collected and are now in the process of being analyzed.

Subjects

The subjects consisted of 198 children from eight sixth-grade classes in the Las Lomitas School District, which is formed from the unincorporated areas of Menlo Park, Ladera, and Atherton, California.

The families range generally from upper middle class, including many professional people, to blue collar workers. All sixth-grade students in each of the eight classrooms in three schools were given the research instruments. Four of the eight classrooms were randomly assigned to control and four to experimental groups. A total of 171 subjects completed both pre- and posttest questions; i.e., complete testing was not possible for 27 subjects.

Approximately equal numbers of male and female students participated in both the control and experimental groups. Class size and proportions of male and female students did not vary significantly from pre- to posttesting. In short, 83 control and 88 experimental-group subjects completed both the pre- and posttest questionnaires. No significant differences in numbers of males and females occurred within or between the experimental and control groups.

Instruments

A series of questionnaires were constructed by the project staff to collect data on the following aptitudes: (1) ability to generate alternative solutions to problem situations; (2) ability to determine consequences of employing a given solution to solve a problem; (3) ability to "decenter," or take the role of another person; (4) ability to describe situational conditions which may be a significant determiner of human behavior; (5) ability to identify problem situations; (6) ability to integrate problem-solving processes--problem identification, generation of alternative means of problem solving, priority setting among alternative solutions, and projecting the consequence of using a given problem-solving alternative with respect to interpersonal, as well as cognitive outcomes.

Analysis of the questionnaires has taken the form of attempting to operationalize a method for evaluating the success of the assessment of the above "aptitudes." The procedures and methods developed by the staff are briefly described below.

Data Analysis

The objective concerned with effects of role-playing on students is currently being assessed from student responses to the problem-solving tasks, for which three scoring matrices have been devised and a fourth is being developed.

The first matrix deals with responses to three questions, "When do people cheat?" "When do people take advantage of each other?" and "When do people try to get even with others?" This matrix has a dimension for locus of control (internal or external) and a dimension of peer and/or adult referent. Scoring and machine processing of these data have been completed and compiled into correlational tables.

A second matrix, based on Thelen's adaptation of Bion's notion of emotionality, is being used to measure two dimensions of student responses to the open-ended problem stories: (1) referent--peer or adult, and (2) modes of adaptation--flight, fight, pairing, dependency, and work. Scoring has been completed and the data prepared for computer processing.

The third matrix has been developed to assess the concrete-abstract continuum of children's thinking in problem-solving situations. Responses will be placed in one of nine categories: irrelevant, moralistic, descriptive action, adult authority, need or wishes, implied peer conflict, cause and effect, alternative solutions, theory building. Rater reliability has yet to be established for this procedure.

Work is in process on the task of producing a method of scoring the decentering task (sensitivity measure), in which students attempt to describe several points of view in problem situations portrayed in photographs. The scoring instrument will be designed to assess the child's own interpretation of the situation and his ability to shift to a realistic viewpoint for each participant in the problem photograph.

The Flander's interaction analysis system was used to describe the behavior of four teachers in each of the three separate role-playing sessions. Recordings were made of each session and separate interaction analysis matrices were constructed for each of the four within-session teacher role-playing functions: warm-up, discussion, role-playing, and summary. Statistical comparisons of within-session matrices, using Darwin's likelihood ratio, showed that teacher behaviors required to fulfill the role-playing functions differed significantly ($p < .005$) from one another. Role-playing matrices were also compared with matrices for an "average" social studies class compiled for a previous study by Turner.[*] Significant differences ($p < .05$) in teacher behaviors between role-playing sessions and Turner's "average" social studies classes were found. Results are currently being analyzed in terms of implications for teacher-training and future role-playing research.

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[*] Turner, B. P. A Study of Leadership Style: Interaction Analysis of an Inquiry-Oriented Human Relations Course and Subject-Oriented Social Studies Classrooms. Unpublished master's thesis. University of Chicago, 1966.

Dissemination Activities

A documentary film was made of one complete session with a 4th and 5th-grade-combination of children, in order to develop a training film for use in later phases of the project. The film has now been tried out with groups of teachers in New York, Idaho, Washington and California. As a result of these try-outs, the film will be further edited.

In June 1967, the National Broadcasting Company filmed a role-playing session with one of the project's teachers and a class of children from the Berkeley City Schools. This became a part of a Special Broadcast on Education, "The Learning Process," presented on June 21. The film clips from that program are now a part of our project's training film material and have been used in the national try-outs previously mentioned.

At present, a training seminar in role-playing is being conducted with a group of secondary interns. This seminar is further clarification of the training procedures and the initiation of a study of the uses of role-playing, both as a teacher-education tool and as a set of skills for beginning teachers.

Experiences and Demonstrations:

The use of role-playing in the curriculum and the techniques involved were presented to teacher and administrative personnel in Boise, Idaho--State Social Studies Conference; Seattle, Washington--National Council for the Social Studies; Mineola, New York--Teacher Education Council; Seattle, Washington--Association for Childhood Education International; Riverside, California--University of California Extension Program; Claremont, California--Claremont Reading Conference; Menlo Park, California--Self-Enhancing Education Project; Berkeley, California--Curriculum Division, Berkeley City Schools; Fresno, California--The California Social Studies Association; Scottsdale, Arizona--The Association for Supervision and Curriculum Development of Arizona - April 19.

Exploratory training sessions were developed with secondary interns in the Stanford program and with public school teachers in a Stanford class.

Observations

In this study, several key tasks are being further delineated. The problems of elucidating pupil insights and skills in transactional operations are being clarified, especially as to their implications for instrumentation. Several new research questions have emerged from this study. Is a specially trained and temperamentally suitable teacher needed for such a process, or can the regular classroom teacher acquire the necessary skills and attitudes? Is the experimental design used in this study appropriate to the objectives described, or does the process required in an experimental design tend to distort some of the essential elements of the role-playing process?

Continued analysis and synthesis of the data collected from the several questionnaires is anticipated. Several research memoranda are being prepared, curriculum materials are being written to accompany the teacher-training films, and four films of individual teachers conducting role-playing in four different classrooms are in the process of being edited for training purposes.

6. Teaching in Small Groups

R. N. Bush

The purpose and rationale of this project, as outlined in the previous Annual Report, remain substantially unchanged. Based upon the assumption that the unique role of the teacher in the future may be in the interpersonal realm and that working with pupils in small groups may be one of the most favorable settings of this role, this project is designed (1) to formulate new models for teaching in small groups, (2) to develop training programs appropriate for each of these models, and (3) to ascertain whether the models can be approximated in the schools and produce desired changes in pupil behavior.

The products of this project will be (1) lists of pupil behaviors which teaching in small groups is designed to elicit, (2) lists of teachers' behaviors (technical skills and professional decision) which will produce these changes, and (3) outlines of alternative teacher training programs with necessary accompanying materials (films, videotapes, rating scales, and observation forms) which may be used in pre-service and in-service training programs.

The activities undertaken thus far in this project consist of surveys of the research literature, intensive staff discussions, observations--direct and through videotape records of teachers in selected schools--and the conduct of trial training programs with experienced and inexperienced teachers in training.

At the beginning of 1967, we were ready to bring in our first group of experienced teachers for a preliminary intensive training session during the summer of 1967 and to begin some training of inexperienced teachers during the school year 1967-68.

One conclusion thus far is that each professional person who looks at the field under investigation tends to take a highly individualized view of it. Even though there is an extensive literature on small group behavior, its relevance for teaching in the schools remains limited and relatively unexplored. Yet, the lack of extensive and tested applications of these ideas in the schools seems to be accompanied by a strong belief in the efficacy of the particular brand of treatment which different investigators believe may be effective.

There has been widespread interest in this problem at the Center, and we have broken the original task force into two divisions. One is concerned with the application of a particular training procedure to a group of experienced teachers, and the other is concerned with the inexperienced teachers in the Stanford intern teacher training program. The following reports briefly describe these different approaches. Subgroups 1 and 2 are working with the inexperienced teachers during the Winter and Spring Quarters: Subgroup 3 began work in the Summer of 1967 with a group of experienced English and social studies teachers and is continuing this work throughout the year. It is anticipated that, during the spring and summer of 1968, the experience gained in these three projects will be integrated into improved plans for further research and development.

A Social Interaction Training Program for Interns

During the Winter Quarter, 1968, Dr. Frank Hawkinshire headed a task force which conducted an experimental training program with Stanford secondary teaching interns.

The need for changes in teaching techniques seems obvious to many who argue about the effectiveness of the schools. One of many proposals is to teach students in small informal groups in which they can have a chance to focus specifically on topics and issues not handled in the lecture situation. The developing interest in small group teaching has been accompanied by a feeling of dissatisfaction about the way teachers are actually teaching these classes. Many teachers assigned to teach in small groups seem to be performing in a manner similar to their previous style in large-group situations. How to get teachers to adapt their behavior to a style more compatible to the small group becomes the question.

The traditional method of attempting to bring about behavior change is to provide "a class" whereby teacher trainees are engaged in lectures, discussions, reading, and reflective writing on the problem. Out of this activity is expected to come an understanding of the problems and techniques that will make teachers more proficient in the new situation. Many have argued that this technique fails to engage the trainee at the level needed to bring about successful behavior change. The trainee ends up"knowing better than he does." To improve on this outcome, the "human relations" approach to training has been developed. This approach is aimed at producing a high level of willingness to engage in new kinds of behavior. This willingness then becomes the self-motivating force which leads to behavior change.

Before answering the question of which approach to adopt for the training (or retraining) of teachers, some prior issues must be examined. One highly relevant issue is, what happens to students as they undergo various learning experiences? As answers to this question become available, one can assess which technique copes with the wide range of discovered problems most effectively.

To study this kind of learning, the two above-mentioned different methods of inducing behavior change were combined into one strategy for work with the Stanford interns assigned to two sections of a course in Social Foundations of Education. The interns have been exposed to a systematic study of social interaction as it relates to teaching. In addition, they have participated in a number of learning exercises: working with learning partners, learning teams, and sensitivity training groups; listening to "lecturettes"; working on sensitivity exercises; engaging in independent study; and recording reflections in daily journals.

In addition to the trainees' participation in the class, they have been actively involved in the research being undertaken. First, each learning team is required to record the classroom sessions along several dimensions. Content records, process reports, sociometrics, and role-analysis documents are compiled and reproduced. These reports, while variable in quality, help give the "students' eye view" of the course on a longitudinal basis. Second, the instructor maintains a weekly report on the training groups, recording the behavior of the participants on an eight-scale instrument. Third, at the beginning of the quarter, each student was classified on a profile form so as to assign him to a theoretical typological group. Fourth, each student was required to make a Q-sort on the role behavior of each student at mid-term. The same instrument will be administered to students at the end of the course. Fifth, each student will be asked to prepare an autobiographical statement at the end of the course.

Using these various measures, we hope to shed light on the question, What happens to students as they undergo various learning experiences? The tasks of analysis include (1) developing perspectives on the personality profile of the students (using the data described above and also the personality data in the Intern Data Bank), (2) developing a typology of the kinds of students in the class and the possible learning style of each, (3) establishing the reactivity factor of each student (or type of student) to the learning process, (4) developing a longitudinal picture of the "natural history" of a learning experience, (5) establishing the vacillation patterns and lability measures of students as they are involved in the learning experience.

Some of the questions to be answered through analysis of the data are: (1) What themes develop in students' writings (about themselves) from this kind of teaching experience? (2) At what point in the learning process do students develop a sense of what is relevant to which type of experience? (3) How do students apply theory of the classroom to their actual teaching? (4) How aware do students become of the differences in their intentions and their behavior? (5) What forces support or inhibit changes in behavior that will bring the behavior more in line with the interns' intentions? (6) How much affective arousal is necessary to have students relate meaningfully to what they are learning?

The classes continued until March 17 at which time the data collection for the first phase was completed. The second phase of the project, using the same procedures outlined above, will be applied to two more sections of the course (about 50 students); the second phase will be completed in June 1968. At that time, the data reduction and analysis will begin. Upon the completion of this part of the project, (third phase) -- that of designing specific intervention strategies for implementing the findings in the teaching of the class next year -- will begin. Experimentation aimed at elucidating specific questions derived from this initial effort will probably be undertaken. These experiments will entail packaging materials and refining teaching techniques that will cope with some of the issues revealed about the learning process. It is hoped that relatively clear guidelines for classroom teaching, using group work skills, will be forthcoming from this effort.

A Laboratory-Seminar in Teacher-Student Interaction

A second task force under the direction of Dr. Robert Koff has been working with another group of Stanford interns to develop their understanding and skill in teaching in small groups. A brief report on this work follows.

In the winter of 1968, an experimental course was taught to 22 Stanford interns. The general pedagogical problem to which the course is addressed is, How can a selected array of "principles" useful to teachers be presented to them so that they will become operational in action and attitude as well as in "thinking about" -- all within a 12-week seminar? That is, how can students within the limits of the classroom be provided with first-hand experience which they can understand and generalize into tentative policies for teaching?

Two assumptions served as starting points: (a) theoretical models for analyzing teacher-learning situations are available, and (b) the teacher should be a diagnostician and evaluator of the social system of which he is a part. These assumptions guided the construction of a course aimed at developing the diagnostic and evaluative skills of the teacher needed to facilitate natural inquiry in the classroom.

It was also assumed that a teacher is better prepared to diagnose and evaluate his own behavior in a social situation if he is sensitive to the concerns of those he teaches, and the development of diagnostic and evaluative skills without a concomitant internalization of a set of policies is probably useless or even detrimental. These assumptions led to an effort to base the seminar firmly in laboratory experience, focussing on the classroom as a social organism with its own norms, values, and status systems.

The subject matter of the course thus focused on the behavior of its students as well as on the "established knowledge" about teacher-student interaction in the classroom.

The course was designed to be self-evaluating. Students were told that they were responsible for writing an evaluative report on the course with respect to (a) specific course objectives; (b) the meaning of laboratory experience for the intern's role as teacher and student; (c) what they felt was learned and why; (d) what they would do differently next year and why; (e) what significant learning experiences occurred and what conditions within the class brought them about; (f) how attitudes of class members toward participation in laboratory experiences changed over time; (g) how attitude change affected group process characteristics of the class, behavior of the teacher, and the meaningfulness of what was learned.

Throughout the quarter, various techniques for data collection were employed: questionnaires (post-meeting reaction questionnaires, the reaction to group situation test, etc.), and individual interviews with group members, tape-recordings of individual class meetings, and observations by "teams" of class members of each class meeting, assigned the role of class observers. Thus for each class session, the data collected allowed the group later to examine its own history. These data served as resource material for the class's attempt to evaluate the course.

The class became deeply involved in learning how to use the data it had collected in order to write the critical evaluation. The students learned something about using empirical evidence to assess their struggle with basic principles of group life as they apply to classroom interaction. A preliminary syllabus and evaluative report will probably be available sometime during the Spring Quarter.

An Experimental Training Program for Experienced Teachers

A task force headed by Dr. Helen Schrader and Dr. Don DeLay conducted an experimental training program during the summer of 1967 at Stanford for a group of 26 secondary school English and social studies teachers. The teachers had, in most instances, been working in "open," or flexibly scheduled, schools and had during the school year 1967-1968 been teaching in small groups.

The primary purpose of the work was to provide for a group of experienced teachers an experience of group process; this experience was intended to consist of coming to grips with one's own experiences and perceptions in order to understand, to articulate, and to use them more effectively in the teacher-pupil context. The goal was to bring about some transfer of method from the experimental workshop to the classroom. The problem was to discover as precisely as possible what happens in such group process and how it can be transferred. Conventional research and analytical methods have thus far proved far from adequate to the task; hence, the second major purpose is the development of a method which will yield productive and useful data about the small group process.

The context of this phase of the study evolved from the development of flexible scheduling programs which provide for small classes and for individualized schedules for secondary school students. Such a program led to a consideration of individualized instruction within the classes themselves. Observations of teacher behavior indicated that for the most part it followed the lecture-presentation mode common to large classes and that teaching and learning were essentially unaffected by the smaller class size and individual scheduling. The classroom situation has been altered significantly with the intention of permitting a change in teacher behavior and in improvement in learning. These spatial and temporal alterations, however, have not produced substantial change or improvement in either teaching methods or learning. The project is exploring conceptions of the teaching-learning situation that might enhance educational benefits in the small group situation.

The philosophical bases upon which the style, design, and purpose of this study were developed cannot be discussed in detail here, but two major points can be made. First, the concept of experience adopted is one which emphasizes the unique, indeterminate, and adventurous nature of any given individual's contact with the world around him. What is interesting, what is "true," or what is merely "correct" often becomes a matter of judgment, perceptual interpretation, custom, or taste. In some cases, of course, a shared frame of reference is adopted to eliminate disagreement (e.g., the use of cardinal numbers in the decimal system as monetary units). But in other areas--such as the relative merits of different political systems, the meaning of history, aesthetics and morality in literature--there are divergent points of view and seemingly irreconcilable opinions, "facts," and interpretations. To respect and to explore these differences so as to improve clarity and usefulness, teacher-pupil communication must be radically changed from one-way to two-way communication. Such a change should help the student overcome his formal training in passivity within the classroom, encourage him to explore and express his own experience, his judgments, and his interpretations of himself, his peers, and his teacher. This change has not been feasible in the large, lecture-type class; it is, however, eminently feasible in the small group.

The second point concerns the nature of perception. The ancient metaphysical idealists and modern logical positivists have assumed that true, universal perceptions are possible, that questions are of such character as to have only two answers: Right or Wrong. But some modern thinkers, among them Wittgenstein, Merleau-Ponty, and the British psychoanalyst R. D. Laing, have developed convincing arguments that the "Right or Wrong" dichotomy is not appropriate to personal perceptions. This view, with its compelling evidence, leads to the position that the traditional authoritative-evaluation stance of the teacher is many times unjustified in the course of learning process.

It is in sympathy with this view and with respect for the personal, individual character of experience that we have designed this section of the project.

The Pilot Workshop

A two-week workshop for 26 secondary school teachers of English and social studies was instituted to give the participants a direct experience in discovering the meaning of a small group as a "thing-in-itself." Two leaders were responsible for 13 participants each. These leaders functioned not on a didactic level, but as non-directive co-ordinators. The stress was on crystallizing events and feelings within the group, making the group itself the message with as many meanings to the message as the number of individuals in the group.

The membership of the groups was changed during the second week to illustrate how each group had indeed formed a character of its own and to bring into awareness the inter-group (transfer) dimensions of the process.

During the fall, two techniques were used to gather suggestions for the next phase of the study. First, the teachers reported verbally on their perceptions of the situation in their own small-group classes, and what changes, if any, had taken place in their teaching behavior and in student behavior. This inquiry was left open-ended to maximize the range of information and suggestions.

Second, videotape recordings were made in the classes of a number of workshop teachers and of another teacher in the same subject area, who was selected by the workshop teacher as one who "teaches as I did prior to the workshop." These tapes are being analyzed by the staff and by a group of psychiatric interns at the Stanford Medical School to determine what behavioral and "atmospheric" differences are most apparent.

The responses of the teachers have been encouraging, although they are not always articulated well enough for "objective" item analysis. There is little doubt in the investigators' minds that the workshop had a significant impact on the majority of teachers. Some teachers have developed departmental small-group sessions with their colleagues and retreats for faculty and parents. Change appears to be taking place as a result of the workshop.

7. Teaching for Divergent Thinking

P. J. Sears

Much attention has been given in recent literature to the learning that takes place under programmed instruction. Computer-assisted instruction is still in its infancy, but its developers have been concerned mainly with rate and error in learning certain content. The characteristics of the learner that have been studied have usually been age, past experience in the content area, IQ, and sex. But there has been considerable speculation that motivational factors and attitudes toward learning influence performance.

Hilgard has proposed a number of characteristics of programmed learning which contrast with characteristics of the more usual classroom instruction by a human teacher: its sedentary and non-social character; its reduction of opportunities for problem solving, divergent thinking, and inquiry; and the possibility that it leads toward conformity rather than diversification of talent. These notions and their implications for the development of children receiving computer-assisted instruction (CAI) have not yet been subjected to careful study.

The present research is directed toward two questions: (1) Are there changes in children's general classroom behavior, broadly conceived (social, task-oriented, motivational, satisfaction, cognitive) over a year's time which may be attributed to a partial schedule of computer-assisted instruction? (2) What characteristics of children, in terms of classroom behavior, predict achievement gains in computer-assisted instruction as distinct from those that predict gains under the usual kind of teacher-led group instruction?

The design of the study involved fall and spring behavior sampling of first-graders' classroom behavior on a number of dimensions. The CAI group of 45 children received approximately 35 minutes per day of CAI; half of the group received CAI reading instruction, and half received CAI mathematics instruction. These CAI programs were under the direction of Patrick Suppes and Richard Atkinson. A non-CAI group of 27 children attended a comparable school; they received both reading and mathematics instruction in the classroom setting with a human teacher. Measures of achievement included indices of progress on the computer for the CAI group and scores on standard achievement tests in reading and arithmetic for both groups.

Method

The Behavior Survey Instrument was used to measure categories of child behavior considered on theoretical grounds to be potentially susceptible to the effects of CAI. These categories were reviewed as to practicability for objective observation. The method used was point-sampling; the observer focused on one child at a time and categorized his behavior in each of seven areas. Since the categorization was intended to represent a momentary sample of the child's behavior, the behaviors observed had to be relatively simple. The observer had to derive his cues from the child's posture, facial expression, activity, or speech. The seven areas were : (a) tendency to pay general attention to a school activity; orientation to task, persistence; (b) satisfaction in task; (c) primary factors in motivation toward task performance; (d) dependence on the teacher; (e) dependency on social interaction with other children; (f) cognitive development in several areas: cognitive style, curiosity, flexibility of mental set.; and (g) general activity level. The reliability of observation for these categories of behavior was estimated from the independent judgments of two-man teams observing the same behavior simultaneously. This reliability estimate was made with two different sets of observers. Percents of agreement on categorization of behavior ranged from 60 to 98 percent.

In the fall of 1966, behavior sampling had been completed on 45 first graders who were due to receive CAI instruction and 27 children due to receive regular classroom instruction in mathematics and reading. Another set of observations was made on the same children in May 1967, after they had had approximately six months of CAI or classroom instruction.

The children in the two groups were from areas highly similar in socioeconomic status. About 77 percent were members of minority groups, with a mean IQ of about 92. The majority could probably be classified as children of the poor.

For the Fall 1966 and Spring 1967 data used here, 20 rounds (separate samplings) of each child's behavior were obtained at each time period. These samplings were separated in time by having the observer sample the behavior of each of the eight to 14 children in his quota (within one classroom) before returning to the first child of the classroom sample. An attempt was made to make the sampling representative of the classroom day, but this attempt may not have been uniformly successful from observer to observer. Since each observer made his observations within one classroom, there is variance ascribable to possible differences (in spite of observer reliability) between classrooms and observation times. The data reported are based on recordings by single observers rather than on simultaneous observation and recording.

Results

Factor analysis of the behavior scores revealed four main factors, accounting for 54 percent of the variance. These were labeled (1) academic behavior, spring (including high loadings on task orientation, achievement motivation, satisfaction, and cognitive behavior), (2) social behavior, spring (including high loadings on social behavior and motivation and negative loadings on achievement motivation), (3) academic behavior, fall and (4) social behavior, fall.

Analyses of variance were performed on weighted linear combinations of variables defining the academic and social behavior factors. Sex and treatment (CAI and non-CAI) served as independent variables. (Analyses of covariance was not used because the groups were not randomly assigned and homogeneity of regression was not found in the two groups.) The results showed no effect of sex and a significant effect of treatment from fall to spring; the CAI group started higher than the non-CAI in social behavior scores but declined, while the non-CAI group increased over the year in social behavior scores. Although regression effects could account for some part of these changes, it was judged that a substantial part could not be explained in this way.

The relationships between IQ, reading and mathematics achievement test scores, and progress on the computer differed in interesting ways for the classroom and CAI groups. Normally, one expects achievement and academic behavior variables to be correlated. The CAI treatment, designed to maximize an individualized mode of instruction, appears to have reduced these relationships. In terms of classroom behavior, the CAI children did not remain as stable from fall to spring as did the non-CAI; it may be that the CAI treatment facilitated changes in behavior (including general reduction in social behavior) which did not occur to the same extent in children not receiving the CAI treatment. A Technical report on these results is in preparation.

Dissemination Activities

A description of the Behavior Survey Instrument was published in the Fall 1967 issue of Childhood Education. A large number of requests for this instrument have been met. The instrument is useful for evaluating changes in the behavior of children in Head Start programs as well as for the purpose of the present study.

An Experiment on Preschool Programs

Also supported by the Center was an experimental study by Lillian Katz, using the Behavior Survey Instrument to evaluate changes in children's behavior under two types of preschool programs; one focused on personal and social development objectives and one on teacher structure. Her observations indicate that the children in the former kind of classes (personal-social development) maintained their initial level of task absorption, decreased slightly in uneasiness, maintained the frequency of their cognitive behavior, and gained significantly in satisfaction. The results for achievement motivation and motility data were inconclusive.

The results of the observations of the children assigned to the teacher-structured classes did not disconfirm this approach since the treatment was not properly applied. These classes were observed to be more restrictive and less supportive than was intended by the treatment design. Under these conditions, the children decreased slightly in task absorption and increased in non-task involved behavior; they remained uneasy throughout the six-week session and failed to gain in the classroom setting. The results for achievement motivation and motility data were inconclusive.

8. A Taxonomy of Teaching Behavior

D. W. Allen

The purpose of this project is to design an instrument for the description of classroom behavior in ways flexible enough to serve the needs of a variety of research projects and teacher evaluation programs yet permitting coordination of data from specific uses of the instrument. This instrument should incorporate the category-system and sign-system approaches used in previous observational studies* and should permit the description of classroom behavior at varying levels of abstraction and detail.

During 1966 and 1967, this project dealt with two major tasks: (a) the development of a preliminary pool of items which could serve as a behavior-descriptive system, and (b) the study of various models and organizing structures to be used with the pool.

The initial pool of items was developed through an extensive review of existing observational instruments, such as the Stanford Teacher Performance Criteria, Medley's OScAR scales, the Wallen-Travers reports, and Flanders's categories for interactional analysis. Many additional items were written to fill in gaps that appeared in cross-tabulations of existing item categories. The items were then cross-indexed according to the key words in each item statement. With each item appearing more than once in the pool, according to the number of key words in the statement, the pool contained approximately 5,000 items.

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* D. Medley and H. Mitzel, Measuring Classroom Behavior by Systematic Observation. In N. L. Gage (Ed.), Handbook of Research on Teaching. Chicago: Rand McNally, 1963. Pp. 247-329.

Several theoretical issues and models relevant to this project were considered at the 1967 AERA symposium on "The Development of a Critical Language for the Analysis of Classroom Behavior," which was organized and chaired by Center staff members. Two papers presented at this symposium have been issued in the Center's Research Memorandum series: Research Memorandum No. 3, F. J. McDonald,"Applying the Language of Behavioral Models to Teaching Acts" and Research Memorandum No. 4, R. E. Snow,"Brunswikian Approaches to Research on Teaching." During the current year, R. E. Snow has written Research Memorandum No. 18, "Toward a Model of Teacher-Learner Interaction" which is also relevant to the project.

After a review of the work accomplished during 1966-1967, it was decided that the current year's activities should be concentrated in three areas: (1) revision and expansion of the item pool, (2) examination of different classification and category systems which might be used to structure the pool, (3) development of a computer-based system for storing the item pool and providing maximum flexibility in its use.

The process of editing and revising the item pool included cross-checking for duplicate items throughout the pool, sharpening the focus of many items, rewording items to reduce ambiguity, and restatement of items in terms of a standard format. Each item was classified as referring to behavior (a) that is ratable, or (b) whose frequency is countable, or (c) that can be treated in both ways. A sample of the items classified in this way is given below:

Items to be rated:

Teacher gives clear and complete instructions for taking test.
Teacher-student communication is clear throughout lesson.
Teacher is impartial in treatment of students.

Items whose frequency of occurrence would be counted:

Teacher rephrases or restates student repsponse.
Teacher refers to self as source of authority.
Teacher expresses approval of student initiated behavior.

Items to be rated or counted:

Teacher participates in class activities without dominating them.
Teacher illustrates main ideas by use of examples.
Teacher cares for individual student problems without disturbing other students.

Several investigations were undertaken to study the structure of the pool in terms of various category systems. Supervisors of the Stanford Secondary Teacher Education Program were asked to classify a stratified random sample of the pool containing 200 items. The classification systems resulting from this procedure were subject to a cluster analysis in order to obtain a composite category system for the supervisors as a group. Additional category systems, including those developed by Smith and Meux[*] and Openshaw and Cyphert[**] were applied to sub-sets of the pool in order to study alternative organizing structures. None of the existing category systems was found to be broad enough to encompass the range of items found in the pool, although large sub-sets of the pool were easily classifiable within these systems. At present no one category system has been adopted as an organizing structure for the entire pool.

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[*] B. O. Smith and M. O. Meux, A Study of the Logic of Teaching. Urbana: Bureau of Educational Research, College of Education, University of Illinois.

[**] M. K. Openshaw and F. R. Cyphert, Development of a Taxonomy for the Classification of Teacher Classroom Behavior. Columbus, Ohio: Ohio State University Research Foundation, 1966.

Much of the work on this project during the current year has been devoted to the development of a computer-based system which will facilitate the use of the item pool. Frank Sobol's approved dissertation proposal in the summer of 1967 outlined the conceptualization of a computer-based teacher performance appraisal system. Building on this initial conceptualization, the project recently completed a computerized system, and a brief description of its components and capabilities is given below.

In this system the item pool is permanently stored on line in the computer. This storage permits easy selection of items through random access techniques and allows items to be withdrawn, modified, and replaced, using a remote terminal located in the Center. New items can be added to the pool in the same manner.

A category generator program is used to structure the entire pool or sub-sets of the pool according to any category system supplied by the investigator. A rating form generator program is used to prepare rating forms for the supervisors of the Secondary Teacher Education Program. Items requested by the supervisors are printed along with the appropriate scale for rating or counting behaviors observed in the classroom.

Other programs being developed for the Secondary Teacher Education Program will store supervisor ratings of the interns and will provide for statistical processing and reporting of comparative and cumulative ratings of the interns. The system will undergo initial testing in the Secondary Teacher Education program during April 1968, and plans are underway to use an expanded version of the system in the microteaching clinic during the summer.

9. 35mm Photography of Attending Behavior

D. W. Allen

This project is aimed at exploring the value of 35mm time-lapse photography in collecting data on the attending behavior of students in their classrooms. Work in the current year involved the completion of a major study and the planning and pretesting of future work.

In the spring and early summer of 1967, W. V. Fanslow completed his work on attending behavior. This study investigated ways of using the 35mm photographic record to sensitize interns to the visual feedback being afforded them by the attending behavior of their students. Four photographic records were made of the clases of each of the 80 intern teachers involved in the study. The first and fourth records served as pretests and posttests; the second and third, as the basis for the treatment sessions. Two sources of feedback were manipulated, resulting in three experimental groups and one control group. For one kind of feedback, a histogram was provided as a basis for comparing (a) the intern's judgments at the end of the class period of the degree of each student's attending behavior.with (b) judgments made by independent raters who rated each student in each frame of the film strip. For the other kind of feedback, another intern rated each student in 15 of the 30 frames made. In all cases, the intern rated 15 frames of his own film strip. It was predicted that interns in the experimental groups would show increased ability to perceive attending behavior cues and that the group with both sources of feedback would show the greatest improvement. Ability to perceive attending behavior cues in the classroom was to be judged by comparing the judgments made by the teacher at the end of the class period with the judgments made by the independent raters of the film strip.

The entire sample (including the control group) significantly increased in ability to perceive attending behavior cues. The independent variables--graphic feedback from independent raters, feedback from another intern, or the interaction of these two--did not produce variance significant at the .05 level.

The reliability of the independent raters in Fanslow's study was high, but the validity of their judgments could not be determined. To gain more information on the important question of validity, a study was conducted by Malcolm Taylor in the Spring of 1967. In this study, a criterion measure of attention was obtained with the method of stimulated recall. This measure was then used to validate judgments made by the independent raters of a film strip of the same class period. The method of stimulated recall, as developed by B. S. Bloom, involves making a tape recording of the class session, and then playing back portions of it to stimulate the recall of the students of events dealt with in test questions. The student's score on the test questions is believed to be a valid indicator of the student's attention, one that is much less affected by factors such as IQ, background information, and test-taking ability than are standard tests. An additional measure of attention was obtained by getting the students to give a self-report on the amount of attention they paid during the period. After appropriate pretests, nine classes were selected, and the three measures of attention were computed for each student in each class. Spearman rank-difference correlation coefficients are shown in the accompanying table.

Rank-Difference Correlations among Three Measures of Attention in Nine Classes

IR = Independent raters' judgments of the filmstrips
SR = Stimulated recall test scores
SSE = Student self-estimate

Class	N	IR vs.SR	N	IR vs.SSR	N	SR vs.SSE
A	20	.23	20	.51	22	.69
B	17	.35	17	.15	17	.33
C	19	.33	19	.41	25	.67
D	21	.45	21	-.10	25	.23
E	19	.26	20	.30	19	.63
F	19	.30	19	.58	25	.64
G	20	.48	20	.42	25	.78
H	19	.26	19	-.03	19	.25
I	20	.43	20	.27	25	.39
Median		.33		.30		.63

During the Summer of 1967, 60 interns were photographed during the 40-minute classes taught by the interns at the beginning and end of the summer session. These data, part of the Intern Data Bank described below, are still in process of analysis. Also, at this time, photographs were taken of the teacher in 12 of these classes; this study was made possible by modifying one of the automatic timers so that it could activate two cameras at once. One camera was then focused on the students, as usual, and the other camera was focused on the teacher. The results of this work will be discussed below.

During the early fall of 1967, the staff examined ways to continue with the attending behavior studies. The best use of the film strips as a training device was considered. Searching for additional measures of teacher and student behavior, the staff analyzed the film strips of the teachers which had been made during the summer. It was found that reliable judgments could be made of where the teacher was looking in each picture. So the following questions could be considered: How consistent would a teacher's pattern of gaze lines be? Does he tend to look at the same students every day? Does he tend to look to the same area of the classroom during different classes? How are patterns of gaze lines affected by teaching experience? The remainder of the fall was spent in designing and beginning a pilot study on these questions. This work is still in progress.

10. An Overview of Research on Teaching Methods

N. L. Gage

N. L. Gage served as chairman of the Committee on Teacher Personnel which prepared the June 1967 issue of the Review of Educational Research on "Teacher Personnel." He selected the other members of the Committee, solicited and edited the various contributions, and with W. R. Unruh wrote a chapter entitled "Theoretical Formulations for Research on Teaching," which was issued as Research Memorandum No. 8 of the Center as well as a chapter in the Review. The major headings in this chapter were entitled The Proposed Revolution in Teaching ("Describing" versus "Improving" in Research on Teaching; Two Convergences on Conceptions of Teaching), Models of the Domain of Research on Teaching, Relation of Theories of Teaching to Theories of Learning, The Need for Synthesis, Views on Promising Directions.

11. Problem Solving Behavior under Conditions Designed to Elicit Response Uncertainty

J. E. Sieber

A goal of education is to prepare students to deal rationally and creatively with new problems. Lower class children, in particular, are prone to dogmatism and inability to generate and evaluate constructive alternative solutions to problems. The purpose of this experiment was to examine lower-class children's acquisition and use of information in relation to task uncertainty and certain differential variables. It is based on the theoretical propositions that subjective response uncertainty may serve as a motivator of information acquisition, and that the ability to generate subjective response uncertainty is dependent on age and other differential, social, and learning variables. These propositions suggest that, if the information-processing characteristics of learners were well understood, information inputs and ancillary instruction on information processing could be so arranged that intellectual development would be enhanced. Accordingly, lower-class children's handling of uncertain decision situations was examined in relation to variables hypothesized to affect it.

The subjects were 88 children in Grades 1, 2, 4, and 6 of a lower-class school, 11 boys and 11 girls in each grade. Each child was given individually administered measures of Test Anxiety, General Anxiety, Defensiveness, Locus of Control and Reflection-Impulsivity. The subjects were individually presented with 18 decision problems counter-balanced with respect to degree of response uncertainty and absence of experimenter-designated choice alternatives. The problems consisted of identifying the objects depicted on slides which the children presented to themselves tachistoscopically (1/100 second) as often as they wished before making a decision. Dependent variables were: number of viewings per picture, latency to viewing, number of correct decisions, and self-reported degree of uncertainty.

Analyses of variance and correlational studies of the data, although most of the correlational analyses have not yet been completed, indicated that (1) subjective uncertainty did not depend upon objective uncertainty, (2) subjective uncertainty was greater when no alternatives were presented than when alternatives were presented, (the opposite of results with middle-class children); this finding suggests that these children failed to consider each presented alternative as a hypothesis; rather they seemed to choose one presented alternative as the answer and ignored the other alternatives; (3) second graders entertained greater subjective uncertainty and engaged in more information search than all other subjects did; (4) anxiety was associated with decreased information search and decreased subjective response uncertainty. These data indicate that subjects are able neither to generate nor to use alternatives. An apparent increase in curiosity at the second grade does not continue to develop.

Secondary Ignorance

The role of subjective response uncertainty in intellectual inquiry and development is being explored. As reported in Research Memorandum No. 17, Overcoming Secondary Ignorance: Learning to be Uncertain, children are often inappropriately certain of their answers; the expression "secondary ignorance" was coined to denote this phenomenon of one's not knowing that he does not know. As reported in that memorandum, ways of teaching children to recognize when alternative answers exist have been investigated. Other ways are currently being devised in preparation for further experimentation.

One aim of this project is to improve understanding of the ways in which secondary ignorance, or inappropriate certitude, is typically expressed in various contexts. For example, such ignorance probably varies in form in different subject matter areas. In social studies much secondary ignorance probably occurs in the form of over-generalization--e.g., "all Eskimos live in igloos," while in science, secondary ignorance may be more likely to occur in the form of students' and teachers' making statements of principles and laws without understanding what they mean--e.g., "relativity is $E = mc^2$." Moreover, such ignorance probably also varies with the age and social class of the students.

Accordingly, J. E. Sieber and four graduate students are visiting lower- and middle-class schools, at all grade levels, observing science and social studies classes, and recording the circumstances and manner in which students and teachers fail to indicate alternative ways of conceptualizing phenomena and to bring information to bear upon evaluating alternatives. A taxonomy of forms of inappropriate certitude is being developed. Examples of inappropriate certitude and methods of teaching students to generate and handle response uncertainty will be formulated into a program for training teachers in pertinent techniques.

A Symposium

A symposium on "Uncertainty, Learning and Thinking" is being formed for presentation at the American Psychological Association meetings in September 1968. Its members will be James M. Driscoll (University of

Louisville), Chairman; John T. Lanzetta (Dartmouth College), "Uncertainty as a Motivational Variable"; Joan E. Sieber, "Secondary Ignorance and Learning"; Gavriel Salomon, "Training for Response Uncertainty"; J. McVicker Hunt (University of Illinois), and Leonard J. Waks, (Purdue University), discussants.

Future Work

A number of foci for future research on subjective response uncertainty are currently being considered; these include studies of the use of uncertainty training: (1) to teach culturally deprived children to develop and consider alternative solutions to the problems which typically confront them; (2) as a diagnostic technique for use by teachers and supervisors as they confront. problems and generate alternative hypotheses about the nature of the problem and possible solutions; a dissertation is being prepared by Gavriel Salomon on some ways of inducing subjective response uncertainty in teachers in their diagnosis of student problems; Louis Weiss is working with supervisors along similar lines; (3) as a technique for exploring the ethical aspects of classroom and other conduct. Such training can serve as an alternative to punishment. The exploration of alternative views on modes of conduct--their consequences, and differences in social acceptability--seems more likely than punishment to result in students' internalizing new views on social behavior; (4) in science teaching; in discussions with Professors Bridgham and Hurd, implications of these methods for new approaches to science teaching and curriculum have been explored.

Dissemination Activities

The following papers have been circulated: Research Memorandum No. 17, Joan E. Sieber, "Overcoming Secondary Ignorance: Learning When to be Uncertain." (Accepted for publication in the *Elementary School Journal*); Research Memorandum No. 26, Joan E. Sieber, "Individual Differences in Decision Making Behavior," (To be published in the forthcoming book, *Uncertainty Information Search and Choice Behavior*, by John T. Lanzetta, J. M. Driscoll, and J. E. Sieber.

The following lectures have been given by Joan Sieber: "Learning When to be Uncertain" at the Symposium on Assessing Learning, California Advisory Council on Educational Research, San Diego, November 1967; "Learning When to be Uncertain," telelecture delivered to Wilmette, Illinois, School District, February 1968; "Uncertainty and Secondary Ignorance," lecture to faculty of Mountain View, California, School District, March 1968.

12. Determinants of Complex Information-processing Behaviors in Children

J. E. Sieber

Ability to profit from instruction is frequently impaired by fear of evaluation. The present research is aimed at two problems: (a) the relationships of anxiety, defensiveness, intelligence, and sex of the learner (and especially the interactions of these latter variables with anxiety) to various aspects of problem-solving in complex learning environments, and (b) the types of instruction which may be used to reduce anxiety at the same time that new problem-attack strategies are being taught.

Since the effects of anxiety on intellectual processes may be facilitating, debilitating, or neutral, and since the construct of anxiety per se has never been adequately been conceptualized or measured, it was considered undesirable and impractical to aim to reduce anxiety. Rather, the aim was to understand how anxiety affects various cognitive processes (e.g., memory, ability to generate alternatives), and how teaching could help students take advantage of the facilitating effects of the anxiety and could not bring into play the debilitating effects. It has been theorized that highly intelligent students learn to use their anxiety advantageously; it is the aim of this research to find ways of teaching all anxious students to use their anxiety advantageously.

Instructional techniques which prove to be successful in the reduction of anxiety in this research can be comprehensively developed as technical skills of teachers. Where such techniques are already being used as technical skills in some other context, they can be reexamined for relevance to the instruction of highly anxious students.

A set of problem-solving and decision-making tasks was designed which permitted examination of many measures of problem-solving strategies (e.g., errors of problem perception, perseveration on wrong strategy, failure to use previously acquired information, forgetting of one's current line of reasoning, inability to synthesize information). The problem-solving of fifth- and sixth-graders was studied in relation to their anxiety level, defensiveness, sex, and intelligence. In addition to examining problem-solving difficulties in relation to anxiety, two forms of experimental intervention were tried: (a) provision of memory support and (b) brief training programs designed to reinforce attention to problem-relevant stimuli and to produce encoding and evaluating such information. The effects of these interventions upon subjects' problem-solving behavior were examined by comparing control Ss with experimental Ss (matched as to sex, IQ, test anxiety, and general defensiveness).

The data have been transcribed, coded, and made ready for analysis, which should be completed by April 1968. The only completed portion of the experiment concerns the relationship between memory-support and anxiety in problem-solving. Forty fifth- and sixth-graders, matched on test anxiety, defensiveness, sex, and IQ, were divided into two groups. Each child solved Porteus maze tasks and a marble puzzle, with or without memory support. An anxiety x memory support interaction effect on the number of errors made prior to solving the marble puzzle was found, as predicted, but it did not occur in the Porteus maze task. The results suggested that the interference of anxiety with short-term memory could be offset by a variety of external aids such as diagrams or notational systems which problem solvers could be taught to use.

This series of experiments has led to a new paradigm for the study of effects of test anxiety on intellectual processes. In this paradigm, the usual problems of definition and measurement in the study of anxiety are circumvented, and research procedures are directly translatable (developed) into classroom practices. Details of this paradigm are presented in Research Memorandum No. 11, "The Relationship Between Test Anxiety and Children's Need for Memory Support in Problem Solving," by Joan E. Sieber.

The remainder of the data are being prepared for analysis. A review of the literature on the effects of anxiety on cognitive processes is being prepared, along with a non-technical paper on the same topic designed for dissemination in a teacher's journal.

Practical ways are being formulated for teaching children how to develop and use their own memory support devices. These include mnemonic devices, diagramming of details (e.g., of complex story plots in literature, and teaching habits of verbal encoding.

A dissertation proposal has been completed by Leon Paulson for a further experiment on IQ x anxiety x task difficulty interactions in relation to the effectiveness of various forms of memory support.

Dissemination Activities

The following papers have been prepared: Research Memorandum No. 11, "The Relationship Between Test Anxiety and Children's Need for Memory Support in Problem Solving," by Joan E. Sieber and Lawrence I. Kameya; Research Memorandum No. 25, "A Paradigm for Applied Research on Modification of the Effects of Test Anxiety on Intellective Processes," by Joan E. Sieber.

Also the following papers were presented: (1), AERA Paper, Joan E. Sieber and Lawrence I. Kameya, "The Relation Between Test Anxiety and Children's Need for Memory Support," February 12, 1968: (2) Joan E. Sieber at Annual Meeting of California Educational Research Association, March 15, 1968, Berkeley, California.

13. Computer-Assisted Instruction for Teacher Education Research

L. E. Knight

In this experimental program, we are investigating the possible uses of currently operating Computer-Assisted Instruction (CAI) systems, with particular attention to the types of instruction which are most suited to presentation via CAI.

The basic hypothesis with which we are working is that students who can make full use of the "learner-controlled" branching capabilities of the computer will attain greater competence in various skills and in a shorter period of instruction time than students who use the same examples in a standard classroom setting.

The first experiment concerned the use of one particular CAI installation in a teacher education program. The facility used (an IBM 1500 at Brentwood School in East Palo Alto, California) was designed particularly for use with elementary school children, but there were no difficulties in adapting it for use with graduate students. One hundred thirty interns in the Stanford Teacher Education Program received instructions on a statistical procedure designed to enable them to combine the test scores of their students on various tests and to come to an accurate final ranking of the students. Thirty of the interns received instruction in a normal classroom situation; the rest received instruction via computer. Statistical analysis indicated that the classroom group scored higher on a criterion test than the computer group, although not significantly (Kolmogorov-Smirnoff test).

The computer program was written to allow for the possibility of demonstrating the usefulness of CAI in performing basic psychological research. The students who received instruction on the computer were divided into two experimental groups: the first group proceeded through the program in a standard, linear manner; the second group was allowed to skip around in the program at will, and the students were free to move ahead or back one frame, or to any of the 12 major concepts in the program whenever they so desired. Our statistical analysis indicated that the "linear" group scored higher on the criterion test than the "flexible" group scored but not significantly higher.

A 25-item retention test and an open-ended attitude questionnaire were administered to all subjects in October to determine whether or not systematic differences existed either among the three treatment conditions or among the various strategy-types within Group II. Results on the retention test indicated no significant difference between the experimental and control groups (Kolmogorov-Smirnoff test). The results of the open-ended questionnaire are being used to develop material for the second program in the experiment.

A new study is being designed to use more capabilities of the computer and at the same time to employ a program of a more abstract nature. The new program being planned will (a) be oriented to specific fields of study (e.g., an English intern will be concerned with a program emphasizing English content); (b) be human-relations oriented rather than dealing with "combining and weighting of grades"; (c) utilize more of the IBM 1500 capabilities (earphones, screen for projecting slides, light-sensing pen); and (d) provide relevant training material for the intern group in the summer of 1968. The topic is "Skillful and Sensitive Evaluation (non-testing) of students in the Classroom."

14. Learner-Monitored Teaching

D. W. Allen

Learner-monitored teaching (LMT) is an outgrowth of work by Robert Mager on programmed instruction. The device derives its name from a television monitoring technique which has been modified and applied to teacher training to facilitate teacher observation with direct and simultaneous supervisory feedback. The equipment for LMT has now been designed and constructed, with the exception of some minor testing and rewiring and is nearly ready for research use.

Current thinking on research with LMT ties it to the framework of microteaching. Among other things, the technique would allow for simultaneous, yet relatively unobtrusive, involvement of both teacher-trainee and supervisor in a teaching encounter. Instead of waiting for delayed feedback on his behavior, the trainee would receive "on-the-job" feedback from his supervisor, as the latter simultaneously views the entire microteaching encounter via the modified closed-circuit television technique of LMT. By means of an audio-video control board, the trainee receives a series of supervisory cues and appropriately modifies his behavior as need be. The entire process can be video-taped and later analyzed for research purposes as well as practical use in the training of teachers.

Tentative plans for an LMT experiment call for comparing simultaneous feedback via audio cues with those via video cues as to its value in supervision. This experiment, relatively simple and inexpensive, would facilitate the needed refinement and "debugging" of the LMT equipment prior to any full-scale research use.

The physical plant of LMT consists of a central control room and a number of small, "satellite" viewing rooms. The basic components are as follows:

1.-Master Control Station: central origination studio-area where one or more individuals (teachers, interns, subject-matter specialists, supervisors, etc.) undertakes a teaching encounter or informational dialogue with a control agent (s). The entire exchange is under the scrutiny of a television camera unit.

2.-Learner Satellite Station: viewing area(s) where the aforementioned exchange is individually monitored via a simple CCTV system by up to six subjects. The subjects are provided with individual TV monitors and audio connections wired for two-way feedback capabilities with the control agent(s). In addition, each station has an intercom wired with a six-button signal circuit which can be triggered in reaction to any one of six predetermined, standardized comments relating to the particular experiment being conducted. When a switch is activated in a satellite station, a light appears on the controller's panel indicating the coded comment and the individual who made it. Each station is equipped with a microphone and a set of earphones which permit each subject to listen and talk back to the control agent(s).

3.-Monitor Control Panel: electronic unit wired for two-way communication via audio or signalling connections with each of the satellite stations. This is the panel operated by the designated control agent(s).

For each of the six viewing rooms, the Monitor Control Panel has a set of buttons on a lighted circuitry which can be activated by the

the subjects in the satellite stations in response to the information being originated in the Master Control Station. The control panel is constructed in such a way that the buttons can be identified with some sort of visual cues which change from experiment to experiment, depending upon the designated objectives of an experiment.

As previously stated, the panel circuitry has been wired to permit two-way communication between the learner stations and the control station, either on an individual or group basis. It is also possible to record the audio and video sources for later playback analysis.

During December 1966, in cooperation with the Stanford School of Education Audio Visual Center, plans for construction of LMT were prepared and arrangements for physical facilities were undertaken. In the intervening time, existing rooms used by the A-V Center (viewing rooms A,B,C, and D) have been altered in such a way that they can readily be adapted to meet wiring and circuiting requirements for the Master Control Station and at least six Learner Satellite Stations.

Closed-circuit television requirements have been met by the addition of six nine-inch television monitors, a signal generator, and a power amplifier for signal distribution to the satellite rooms. The intercom units and signal lights for the six satellite stations are almost completed. Each of these units contains a microphone and a series of electronic signalling lights which lead to the Master Control Panel.

The Master Control Panel is also near completion. On this panel are arranged six rows of twelve lights and six two way switches, each row corresponding to one of the six satellite signalling boxes. Beside each light is an electronic counter which will record the number of times that light is signalled from a particular satellite station. A running count of the number of times one particular light has been signalled on all six rows is indicated by a cumulative counting device.

As presently constructed, audio communications for the LMT unit between the controller and the satellite rooms is essentially a one-way affair, with the controller listening to comments from the outlying rooms which can be recorded on IBM dictating machines (these comments ordinarily would be things that cannot be expressed by the signal lights). The Master Control Panel has been constructed so that the controller may listen to comments individually, or he may throw the communication links open to two, three, four, or more of the satellite stations at the same time.

Essentially, LMT can provide the research worker in education with a means of observing the effects of immediate feedback and direct involvement in the teaching-learning process. With minor alterations in the basic equipment, many applications are possible, such as the following:

1. An intern teacher could take the role of the control agent and question a subject-matter specialist; in each satellite room students would observe the questioning and in turn direct comments, suggestions, and reactions to the controller by way of the intercom and/or the electronic signalling device on the Monitor Control Panel. Under such conditions, would the intern, after a number of such sessions, gain an insight into the way students think? Would he begin to anticipate the types of questions his students may ask? On the other hand, would the student who has been in constant communication with the teacher learn appreciably more, having been a direct participant in the teaching situation, than

he would have were this involvement not provided?

There are, of course, any number of alternative ways this device could be arranged. The intern could attempt to teach a lesson while serving as a controller; there could be supervisors in the satellite rooms; doctoral supervisors could be placed in the satellite rooms while intern supervisors, as controllers, could counsel interns.

2. LMT could have particular usefulness in sequencing curriculum. For instance, an intern could be involved in a micro-teaching encounter, and concomitantly, he would be monitored by six other students in the satellite stations. At the onset of the lesson, the intern could specify the course objectives to all students. As the intern progresses in his teaching encounter, the students in the stations would signal him requesting changes in the instruction pattern -- specific information, change in pacing, etc. -- which in turn would facilitate their understanding of the lesson.

The number of student requests to a teacher over a period of time could be plotted on the Monitor Control Panel. Thus, one criterion of teacher effectiveness would be described as the lowest number of requests made by the students in the satellite stations. The lower the number of outside requests for alteration of the instructional pattern, the more effective the instructional pattern for the target population in the learner stations. In this manner, instruction is sequenced to meet the user and make learning more meaningful.

3. A variation of the aforementioned approach might be useful in the validation of instructional materials. For instance, a lesson could be prepared to mirror three different teaching approaches. LMT would

be applied to ascertain which one of the three methods received the lowest amount of alteration requests from the satellite stations. The subjects in the satellite stations could be selected according to specific variables, e.g., level of educational achievement, social environmental upbringing, etc., in an effort to match individual learning differences with the level of experience at which the student comes to the teaching situation.

b. The Personological Domain--Teacher Traits and Characteristics

1. Teachers' Attitudes and their Correlates

N. L. Gage

In the preceding Annual Report, two projects were described as being in progress. The first of these projects was aimed at developing methods for determining causal relationships between teachers' attitudes toward pupils and pupils' attitudes toward their teacher. A paper on this project entitled "Determining Causal Relationships in Socio-Psychological Inquiries: Four Techniques," by A. H. Yee and N. L. Gage was issued as the Center's Research Memorandum No. 9, has been accepted by the Psychological Bulletin, and is now in press.

The second project, a factor analytic study by means of diagonal factor analysis of a 100-item inventory of pupils' perceptions of their teacher, was aimed at determining whether five a priori categories of teacher merit (cognitive, affective, disciplinary, motivational, and innovative) would be supported by empirical work. A paper tentatively entitled "Pupil Perceptions of Teachers: A Factor Analysis of 'About my Teacher'" by Walter W. Zwirner, William R. Beck, Lee J. Cronbach, and N. L. Gage has been drafted and is near completion.

Additional projects outlined in the preceding Annual Report have been carried forward. The first of these, the collection of research instruments, has taken the form of a file that now contains 78 instruments located in the Center's Library. The second project, a testing program for the Stanford Teacher Education Program, was carried out during June and August 1967 and is further described in this report in the section on the Intern Data Bank.

The development of a multi-dimensional inventory of teacher attitudes and beliefs has taken the form of administering the Educational Opinion Inventory--300 agree-disagree items developed by N. L. Gage and M. Weitman--to approximately 160 interns in June and August 1967, before and after the subjects were students for the Summer Quarter in the Stanford Teacher Education Program. A factor analysis of this 300-item inventory is now being planned by N. L. Gage in collaboration with the Center's Research Methodology Unit, especially Richard Lindeman.

The project on the validation of teacher personality and characteristics against classroom behavior is now being planned with data from the Intern Data Bank and the Educational Opinion Inventory described above. Each of the 300 items and various scales derived through factor analysis will be correlated with measures of intern behavior as recorded on videotape during the June and August 1967 collections of data for the Intern Data Bank. As of this writing, this work is just getting underway, the data having thus far merely been put in proper form for storage and retrieval by computer. Techniques for "rating" or "coding" the various relevant behaviors in the videotape recordings of teaching behavior have been developed, personnel to make these ratings and codings have been trained, and the protocols of approximately 20 interns have been rated. The teaching behaviors against which the responses to the Educational Opinion Inventory will be validated are "reinforcement," "probing," "higher order questioning," and "the use of silence."

2. Teachers' and Students' Cognitive Preferences in Mathematics

R. W. Heath

This report describes initial attempts to extend psychological research on cognitive styles to the study of teaching. Prior research on cognitive styles has emphasized the "learner" half of the hypothetical "teacher-learner" interactive process. Heath[*] compared preferences for differing modes of attending to the subject matter of high school physics. PSSC students showed a greater inclination than those in a traditional course to attend to fundamental concepts and to ask questions in pursuit of basic understanding. Omura[**] examined relationships between cognitive preference as measured by Heath's test and interest in school subjects. Students who favored mathematics, social studies, art, music, homemaking, and physical education had a stronger preference for "memory of specific facts or terms" and less preference for "critical" questioning of information" than did students favoring physics and chemistry. In a cross-cultural study, Haslerud and Umemoto[***] found that Japanese school children adopted a more positive attitude toward number situations than did American school children. Travers[****]

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[*] Heath, R. W. Curriculum, cognition and educational measurement. Educational and Psychological Measurement, 1964, 24, 239-253.

[**] Omura, A. Cognitive preferences in high school physcis. Tokyo, Japan: University of Tokyo, 1966 (mimeo).

[***] Haslerud, G., and Umemoto, T. Responses and attitudes of American and Japanese children to number situations: a comparative study. Urbana, Illinois: University of Illinois Committee on School Mathematics, 1964, (mimeo).

[****] Travers, K. J. "Forced-choice preferences for problem solving situations in mathematics." Unpublished doctoral dissertation, University of Illinois, 1965.

modified the Haslerud and Umemoto instrument and investigated the preferences of junior high school students for different kinds of problems expressing the same mathematical concept. Highest preference was expressed for problems dealing with familiar situations involving social and economic applications while least preference was expressed for abstract number situations.

The present research was concerned with the cognitive preferences of both teachers and learners and their possible interactive relations. It was first hypothesized that both students and teachers differ reliably in their preferences for modes of mathematical expression. Some persons prefer to think of numbers as points on a line, for example, while others prefer to deal with symbolic expressions of number, i.e., numerals. The mathematics teacher continually makes choices as to what forms of expression to employ at a given point in the instructional process. Suppose then that the teacher knew the predominant preference of his pupils and the preferential "address" of the topic he was about to teach. Presumably, he could select the corresponding mode of teaching the mathematical concept and in this way improve learning. Does such an effect really exist? If so, is it substantial enough to be of educational importance? Once the existence of cognitive preferences has been established, their significance for classroom learning may be studied. For example, (1) are preferences for modes of expression of mathematics teachers related to teaching success? (2) does correspondence between teacher and student preferences facilitate instruction? (3) should teachers be trained to use different modes of expression with different kinds of students and with different mathematical topics? (4) are preferences for modes of mathematical expression modifiable by instruction of teachers in, say, institutes on technical skills of teaching and, in students, by different teaching practices? (5) what are the relations between preference for modes of mathematical expression and other possible "aptitude" dimensions of students and teachers?

To measure differences in preferences for modes of expressing mathematical ideas, an instrument, the Cognitive Preference Inventory, was developed. Three a priori modes of expression were specified: verbal, symbolic, and graphic. For a given item, the same mathematics concept is expressed in these three different ways. Suppose, for example, the topic is the Pythagorean Theorem. Three representations of this concept are shown in Figure 1.

These three alternatives comprise Item 13 of the inventory. Thirty such items were written for pretesting. A different mathematics topic was used in each item. The student and teacher forms of the inventory differ only in the directions for responding to the items. Directions for the student form of the inventory instruct the respondent to read the three options in each item to determine the concept being dealt with, then choose the one mode which "appeals to him most."* Directions for the teacher form instruct the respondent to read the three options to determine the concept being dealt with, then choose that mode which he would prefer to use in teaching that concept to students.

The trial form of the student inventory was pretested in the spring of 1967. The sample consisted of 75 elementary school teachers in a

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* In a subsequent form, the wording has been modified to read, "If you were learning about this mathematical topic, in which of the three ways would you prefer your teacher to explain the idea to you?"

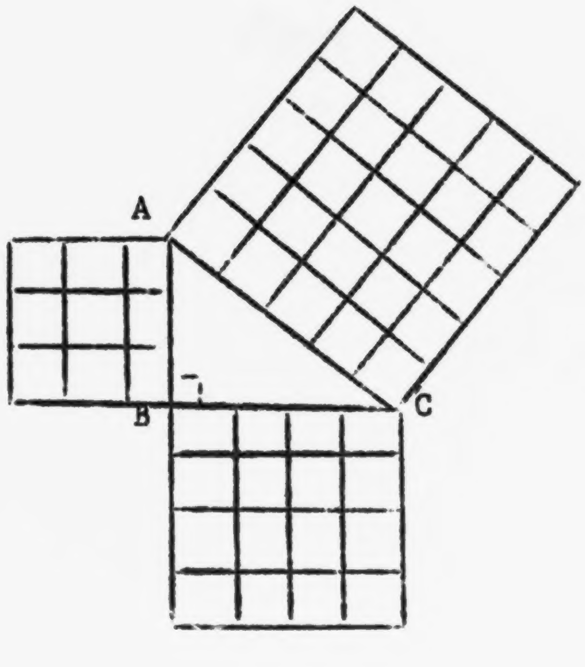
13.

a) For any right triangle, the square of the length of the hypotenuse is equal to the sum of the lengths of the other two sides.

b) $\overline{AC}^2 = \overline{BC}^2 + \overline{AB}^2$

where B is the right angle of △ABC

c)



13. a b c

Fig. 1. An item from the Cognitive Preference Inventory

mathematics course at a university in the State of Washington. The test was administered by the instructor of the course, a visiting staff member from the School Mathematics Study Group at Stanford University. Administration time was 30 minutes, although many teachers completed the test in 20 minutes. No other data on these teachers were available.

The summary statistics from the pretests for both students and teachers show that, in general, the symbolic option was most often preferred. The various reliability indexes (coefficient alpha and corrected split-half) are about .90 for each of the three preference scores (verbal, symbolic, and graphic) for both students and teachers, but these scores are not, of course, experimentally independent.

The correlations between each of the three scores for students and nine Iowa Test of Basic Skills (Form I) scores indicate that symbolic preference scores are positively related (rs range from .27 to .42) to the various basic skills (vocabulary, reading, graphs, arithmetic problems, arithmetic concepts, etc.), while the other two scores, since they are experimentally linked, are negatively related to a somewhat lower degree.

A usable balance among preference scores is produced by the test. Cognitive preference, defined as "preference for mode of dealing with a concept" for the learner, and as "preference for mode of teaching a concept" for the teacher, appears to be characterized by similar patterns of preference in both students and teachers. Although the Inventory is at this stage wholly experimental, it does appear that it can be used to identify differences in preferences. Two problem tasks are suggested: (a) a revision of the test directions that makes the basis for choice of option clearer, and (b) trial administration to samples of students in other grades to check stability of scores across chronological age and achievement levels.

The generally positive findings of the study indicate that further investigation in the area is warranted. Answers to several of the questions raised at the beginning of this paper are being sought in a study by the authors presently underway. Three independent variables are being used:

1. Teaching mode. Filmed lessons on selected mathematical topics will be taught by a master teacher in each of the three modes, verbal, symbolic, and graphic. Independent raters will judge each film for parallelism of development of each topic and distinctiveness of mode of presentation.
2. Mathematical topics categorized as characteristically verbal, graphic, or symbolic, on the basis of item-analysis statistics from the pretests. For example, Item No. 13 elicited a graphic preferences response from 44 percent of the 115 junior high school students tested. Therefore, in the study, the Pythagorean Theorem would be classified as a "graphic" topic.
3. The student's preference for mode of mathematical expression by students. In a revision of the instrument, students will be asked to indicate their preference, as learners, among the three forms of expression. Students will then be categorized as predominantly verbal, graphic, or symbolic.

The purpose of the proposed study is to determine the main and interaction effects of (a) teaching mode, (b) pupils' cognitive preferences, and (c) subject-matter topics (categorized by cognitive preference) on pupil achievement.

3. Pupillometry in the Study of Teacher Attitudes

R. H. Koff

In the last half-century, the activity of the pupil of the eye has been studied in a variety of research areas: classical conditioning, orienting behavior, autonomic activity, sensory processes, pharmacology, and psychopathology. Currently, the pupil is attracting much interest because of its potential as an indicator of emotional and cognitive activity. The delicate responsiveness of the iris with its control by sympathetic, parasympathetic, and supernuclear mechanisms has intrigued numerous investigators.

Factors classically described as involved in the regulation of pupillary activity include accommodation, the light reflex, and autonomic nervous activity (Loewenfeld[*]). In a synthesis of the literature on mechanisms which regulate pupil size, Lowenstein and Loewenfeld[**] concluded that during various cognitive and emotive states, regulatory mechanisms involving cortico-thalamo-hypothalamic systems also participate in the regulation of pupil size. Hess and Polt[***] in two papers published in Science demonstrated the effect of cognitive variables on the size of the pupillary opening. Recent research has been generated by their findings that interesting visual stimuli and mental arithmetic produce pupillary dilatation. In short, the apparent availability,in the form of pupillary dilatation, of a subtle indicator of attention has aroused great hopes in fields ranging from psychophysics to education.

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[*] Loewenfeld, I. Mechanisms of reflex dilatation of the pupil. Documenta Opthalmologica, 1958, 185-448.

[**] Loewnstein, O. & Loewenfeld, I. The pupil. in Dawson, H. (Ed.) The Eye. New York: Academic Press, 1962, 3, 231-267.

[***] Hess, E. & Polt, J. Pupil size as related to interest value of visual stimuli. Science, 1960, 132, 349-350.

Hess, E. & Polt, J. Pupil size in relation to mental activity during simple arithmetic solving. Science, 1964, 143, 1191-1192.

Hess and Polt* suggested that the pupil dilates in response to positive affects or "interests" and constricts with negative affects or "interests." Other investigators have subsequently confirmed the dilation response to positive stimuli, but they have been unable to observe a constriction response to negative stimuli (Woodmansee**; Pavio & Simpson***; Peavler & McLaughlin****). Numerous other studies have shown that increase in pupil diameter is significantly related to attending to sensory stimuli (Hakerem & Sutton*****), and the amount of mental effort involved in storing information for report (Kahneman & Beatty******).

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* Op. cit. (1960)

** Woodmansee, J. An evaluation of pupil response as a measure of attitude toward Negroes. (Doctoral dissertation, University of Colorado) Boulder, Colorado: University Microfilms, 1965.

*** Pavio, A. & Simpson, H. The effect of word abstractness and pleasantness on pupil size during an imagery task. Psychonomic Science, 1966, 5, 55-56.

**** Peavler, W. S. & McLaughlin, J. The question of stimulus content and pupil size. Psychonomic Science, 1967, 8, 505-506.

***** Hakerem, G. & Sutton, S. Pupillary response at visual threshold. Nature, 1966, 212, 485-486.

****** Kahneman, D. & Beatty, J. Pupil diameter and loan on memory. Science, 1966, 154, 1583-1585.

In summary, a detailed inquiry into the neurological, opthalmological, and psychological literature supports the hypothesis that changes in pupil diameter are closely associated not only with the visual centers of the brain but also with numerous other brain centers. In particular, Lowenstein* stated that:

> It is today an almost universally accepted fact that every psychic process is accompanied, in normal man, by changes in pupillary diameter. When a normal subject is asked, for example, to count the ticks of a metronome, and when the pupils are observed simultaneously with the appropriate means, it can be seen that pupillary movements, that is dilatations, run parallel to the beats of the metronome. Dilatation of the pupil can be observed also as accompaniment of other mental processes; with every increase of attention by intellectual processes of every kind, the beginning of volitional impulses, or during the course of emotions.

Theories regarding the processes of attitude development suggest that attitudinal differences may be reflected in certain physiological response characteristics. Although the responses of the autonomic nervous system are not observable behaviorally, they can be measured with precision; and this measurement is not dependent upon verbal responses subject to purposeful distortion.

The research objectives of the pupillometry project are to extend our knowledge of the relationships between teacher attitudes, as measured by traditional (broadly defined) means and an involuntary physiological response--pupillary dilatation. Pupillary response may have potential for continuously assessing the attitudes of teachers on a variety of interpersonal and intrapersonal dimensions. It is assumed that attitudes are located at various points along an approach/avoidance continuum and that, despite considerable stability around a "base line," they vary continuously with time. For some purposes, attitude assessment should include measurement of those momentary fluctuations of internal tendencies toward approach or avoidance behavior. The pupillometry project is designed as an inquiry into the relationship between overt expressions of motivational and emotional states and the pupillary response.

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* Lowenstein, O. Experimentelle Beitrage zur Lehre von den katatonischen Pupillenveranderungen. Monatsschr. Psychiat. u. Neurol., 1920, 47, 194-215.

The results of this project may have value in relating attitude structure to teacher training practices and in relating attitudes of teachers to their behavior in the classroom.

The pupillometry project staff have focused on (a) development and construction of a photographic pupillometer; (b) development of techniques for scoring and analyzing pupillometric data; (c) analysis of the social science literature on the anatomical, physiological, and clinical aspects of the relation between pupillary response and the nervous system; (d) pilot studies designed to test newly constructed equipment and replicate previous experimental findings, in collaboration with Center and other Stanford staff; (e) studies designed to assess relationships between attitudes of teachers toward dimensions of teacher-pupil interactions. A brief discussion of each of the areas of research and development is presented below:

The construction of a photographic pupillometer has been completed. The apparatus was designed for recording of pupil diameter and stimulus presentation. A research memorandum describing the apparatus is in preparation and is tentatively entitled: Specifications and Manual for a Photographic Pupillometer. Block diagrams and cutaway drawings are, however, presently available.

The pupillometer allows infra-red photography of the eye to be synchronized with the presentation of a variety of stimuli (visual, auditory, etc.). The apparatus is designed so that: (a) an adjustable frame-rate mechanism allows photography of the pupil to proceed at any given rate from 1 to 20 frames per second; (b) heat producing infra-red wave lengths are prevented from hitting the eye by means of placing a specially constructed "hot" mirror in front of the eye and photographing through the mirror; (c) photography of the pupil is "on line" which eliminates distortion of the pupil during measurement; (d) the exact amount of illumination emitted from the light source is controlled by means of a specially constructed "electronic gate"; (e) a simple beam-splitting mirror attached to the lens of the camera allows binary bits of information to be placed on each frame of the infra-red film so that each frame of film contains a frame count from 1 to N, and individual subject identification number, a stimulus indicator, a control indicator, an experimental run number, a stimulus input indicator, and a subject response indicator; (f) all stimulus materials are "time-locked" or synchronized with the subject's response and photography of the pupil.

Pupillographic experiments require exact control of light conditions, and the use of light-content pictures of stimuli increases the difficulty in controlling this variable. The project staff has devoted considerable time and effort to developing techniques for constructing black and white stimulus materials for use in the pupillometer. A description of the procedures for photographing stimulus materials, and an inventory of stimuli are available.

Theoretical issues relating pupillary changes to visual stimuli, provided light controls are employed, have been raised by Loewenfeld.[*] She argues that optically a picture is a combination of bright and dark areas which reflect light energy to the retina. Thus, theoretically, no matter how much the contrast in a given test stimulus is reduced, the pupil will respond to differences in light flux. In addition, there may also be individual differences in sensitivity to the light flux properties of the stimulus. Pictures in color complicate this problem further, since neuro-color receptors of the eye are not dispersed evenly over the whole retinal area onto which the stimulus is projected. Shifting from one stimulus to another or from one image to another within a given stimulus necessarily results in retinal stimulation and, hence, pupillary response. In short, Loewenfeld claims that the interaction of these uncontrolled variables and the use of visual stimuli may well account for the heterogeneity of findings in pupillographic research.

The project staff, systematically investigating the use of visual stimuli, has found Loewenfeld's criticisms to be substantially correct. Yet, although Loewenfeld's criticisms of the use of visual stimuli are significant, studies by Kahneman and Beatty,[**] Hess and [illegible]lt,[***] and others have shown that auditory and olfactory stimuli can serve as alternatives to visual stimuli in pupillographic research. For research purposes, the project staff has developed the following controls: (a) extraneous stimuli within the pupillometer have been eliminated--stimulus image size is no larger than a four-inch square; (b) pupillary response to "control" stimuli has been reduced by having Ss view a control "dot," thus keeping pupillary activity as constant as possible over all control periods; (c) Ss are screened for visual acuity, and only Ss with 20/20 vision uncorrected are utilized; (d) control for dilatation due to the near-vision reflex is accomplished by placing visual stimuli at a distance of one meter from the eye; (e) control for dilatation due to accommodation (interocular movement of the lens) is accomplished by reducing the size of the stimulus field as in a above and by directing Ss to fixate on the target stimulus; (f) all Ss are dark-adapted prior to experimental trials; (g) high-speed infra-red film is used to photograph the pupil; (h) only black and white visual stimuli are employed when visual stimuli are used; (i) experiments are conducted to replicate findings using visual stimuli with stimuli in other sense modalities--auditory, olfactory, etc.; (j) the presentation of stimuli is time locked, to the best of technical ability, to S response characteristics; (k) repeated photography of the pupil in association with the presentation of the stimulus serves to increase the total number of observations of the pupil over several time periods and thus theoretically increases the signal-to-noise ratio by reducing physiological system noise and increasing the probability that the response is a function of stimulus input; (l) Ss are given frequent rest periods between experimental trials.

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[*] Loewenfeld, I. Pupil size. Survey of Opthalmology, 1966, 11, 291-294.

[**] Beatty, J. & Kahneman, D. Pupillary changes in two memory tasks. Psychonomic Science, 1966, 5, 371-372.

Kahneman, D. & Beatty, J. Pupillary response in a pitch-discrimination task. Perceptual and Psychophysics, 1967, 2, 101-105.

[***] Hess, E. & Polt, J. Changes in pupil size as a measure of taste difference. Perceptual and Motor Skills, 1966, 23, 451-455.

The development of techniques for scoring and analyzing pupillometric data has resulted in a pupillometric program package consisting of two sections. The first section digitizes or electronically scans the photographic film by means of a high speed optical scanner available through the Stanford Linear Accelerator Center. The program converts each frame of film into a numerical (pupil diameter) value and automatically places this value onto BCD tape along with relevant coded information from the binary bits that appear on each frame of film. The section analyzes the raw input information derived from the first section and provides a variety of options, including various statistical transformations, parametric and nonparametric significance tests, etc. Output is in both tabular and graphic form. The second section is also able to handle additional variables--such as scores obtained from paper-and-pencil tests--so that correlational analyses can be made in one complete step.

A manual describing these two program packages in detail is in preparation and will probably be completed by July 1968.

A detailed survey of the literature dealing with pupillometric research, particularly in the social sciences, is nearly completed in the form of a research memorandum entitled "Bibliography and Classification of the Literature on Pupillary Response." Over 1500 references have been examined and verified. The memorandum will contain two sections: bibliography and classification. In the bibliography section, references are listed alphabetically by author with each entry numbered. The classification section contains an outline of topics categorized according to year of publication, subject matter (e.g., general psychology, eye movements, conditioning), foreign language, journal identification, reference category (essay, book, journal article), research design (experimental, correlational, case study), and type of target population. Classification of references was based for the most part on titles and was made in terms of variables manipulated in the studies.

Several pilot studies have been made and are in the last stages of data analysis. The staff has been confronted with the problems of trying to analyze data with a computer program that still contains errors. One study has, however, been completed and has appeared as Research Memorandum No. 20, "Sociometric Choice: A Study in Pupillary Response." This paper was presented at the American Educational Research Association meeting in February 1968.

The project has collaborated with Center and Stanford staff in research on (a) cognitive preferences: a study in pupillary response (with Robert Heath); (b) levels of word recognition difficulty: implications for evaluating computer-assisted instruction in reading (with Hal Wilson); (c) involuntary components of assimilation and processing of information: a study in cardiovascular and pupillary response (with E. R. Hilgard); (d) voluntary components of information processing (a proposed doctoral dissertation by John Lennox).

A study of "Structural and Interpersonal Components of Teaching Style: A Study in Pupillary Response" has been made, and the data are in the last stages of analysis. The study was designed to deal with two questions: (a) the correlation between paper-and-pencil and pupillary measures of attitudes, and (b) the change in attitudes of teacher interns toward various teaching situations after intensive training in teaching methods.

The experiment was conducted in four phases. Phase 1 consisted of a "paired-comparison pretest" on the first day of a summer training program for teacher interns. The interns recorded on paper their preferences for drawings of various teaching arrangements (desks, tables, and chairs). Phase 2 consisted of the "pupillometry pretest." Teacher interns who demonstrated 20/20 vision were asked to view the same pictures that they had rated in the paired-comparison task. Phase 3, the "paired-comparison posttest," was conducted six weeks after Phase 1. During the six-week period the interns participated in a full-time teacher-training program at Stanford University. Phase 4, the "pupillometry pretest," followed Phase 3 by two days.

Data are being analyzed to determine relationships between the paper-and-pencil choices and changes in pupillary diameter. Data from the Intern Data Bank Project will also be correlated with pupillary behavior.

Research goals for the next several years are to continue to inquire into the relationship between involuntary pupillary response and such variables as attention, interest, and mental activity. Research findings with the pupillary reflex are rather firmly established, but they are somewhat unrelated and unsystematized. It is difficult to evaluate the diversity of hypotheses advanced to account for differences in physiological response patterns. For example, pupillary responses have been considered by Rubin[*] to be a measure of autonomic balance in psychosis, while Hess and Polt view changes in pupil diameter as directly related to interest value. Kahneman and Beatty hold that the pupil diameter may serve as an indicator of the amount of load on memory, or more precisely, of the amount of mental effort involved in storing information for report. A method for assessing task difficulty, information-processing load, and "interest", of the kind that the pupillometry project is seeking, will help research and development in teaching.

The difficulty of measuring and controlling for a wide variety of confounding effects means that much basic research is necessary before the generalization that change in pupil diameter indicates interest, attention, or cognitive complexity can be made. In short, research is needed that will: (1) detail relevant considerations for the design of pupillometric studies (e.g., light, near vision reflexes, fatigue, anticipation and order of effects, apparatus, etc.); (2) outline the relevance of conditioning studies to pupil physiology; (3) determine the cognitive and affective correlates of pupillary activity; (4) describe in detail the relationship between pupillary activity and other psycho-physiological indicators.

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[*] Rubin, L. Pupillary reactivity as a measure of autonomic balance in the study of psychotoc behavior: A rational approach to chemotherapy. Transactions of the New York Academy of Science, 1960, 22, 509-518.

c. The Institutional Domain--Teaching Roles in their Institutional Setting

1. The Teacher in 1980

R. N. Bush

The project on "The Teacher in 1980" has worked itself out of a job. Increasingly, the teacher of the future has become the concern of the Center's entire program, an objective which the project was originally intended to accomplish. While the project itself has not been responsible for this successful outcome, it has contributed, along with a number of other forces, to this state of affairs.

The Center began in its first year (1965) of operation a consideration of what the future role of the teacher might be. Since then, the topic has received widespread attention in the press and professional literature. Papers, conferences, and projects on the teacher for tomorrow have become the fashion of the day. We have read an extensive bibliography and completed a thorough review of the subject. This review, which will present the situation as it is now perceived, will appear as a research memorandum and is now in the stage of receiving its final editing.

The series of seminars, with outside experts called in to prepare the papers for internal discussions, has not been held this year because the internal discussions in our projects and programs were so thoroughly future-oriented that the need for the series no longer existed. Accordingly, a decision was made early in the year to divert the resources allocated to the series to permit further development of the Data Bank Project, which seemed to have higher promise for contributing to the development of a Center Focus and an integration of the different projects in the Center.

As we conclude the year, we are satisfied that this was a wise decision and we are accordingly drawing the project on the Teacher in 1980 to a conclusion at this time.

2. The Organizational Context of Teaching

G. W. Sowards

The purpose of this project is to investigate the problem-solving efficiency and style of teaching teams organized with and without designated leaders. At present, many school systems are organizing their staffs into teaching teams in either hierarchical or collegial patterns. This work is in large part without any attempt to ascertain the applicability of sociological and social psychological research on small-group functioning to teaching teams. The variable of having a designated team leader seems especially relevant to the goal of achieving the full potential of a small group.

To carry out this study, approximately 15 elementary school teaching teams without designated leaders, and ten ad hoc elementary school teacher groups, all with four or five members, were asked to solve the same two problems under standardized directions and time limits. The work sessions of each of these approximately 40 teacher groups were recorded on audiotape and transcribed. Additional information was gathered from each teaching team on their members' perceptions of the way in which they carried on their team work, their attitudes toward their team experience, and their preferences for assignment in the next school year.

At the present, all of these data are undergoing final analysis, A research report should be available about April 1, 1968, on findings and conclusions.

3. The Professional Socialization of the Teacher

G. W. Sowards

The aim of this project is to identify and examine factors that affect role expectation and commitment in teaching and that influence career mobility. The project has been envisioned as including not only cross-sectional studies of teacher attitudes and perceptions of teaching behavior, but also longitudinal case studies of teachers. The questions considered to be relevant include the following:

1. How does the kind of help a beginning teacher receives vary within and across school districts? What are the variations in the way in which this help is viewed and interpreted by the teachers and those who render the help?
2. What experiences of the teacher are most critical in the evolution of his role expectation and career commitment?
3. From the standpoint of a beginning teacher, what constitutes a "good"school, and what criteria do beginning teachers invoke initially in job selection?
4. What criteria do school systems use in the initial placement of beginning teachers, and what do these criteria suggest about the school system's definition of a "good" school in which to begin teaching?
5. How much horizontal mobility (intra-system transfer) occurs within a district, and how is such mobility related to individual teacher attitudes and aspirations?
6. For the beginning teacher, what qualities characterize the successful teacher? How stable is this characterization during the first year of teaching?

7. For the beginning teacher, what changes occur in the first year in role definition and role expectation? How are such changes related to the teacher's training and background?

During the first year, since July 1967, the project has focused on the last two questions, with particular attention to socialization effects on the beginning teacher's sense of autonomy and definition of success. Three questionnaires were administered at the beginning of the school year (September 1967) to all teachers (approximately 1200) in one school district. In Questionnaire A, the items are primarily biographical, providing data on a range of independent variables. In Questionnaire B, the items deal with teacher attitudes and expectations as to teacher autonomy and professional responsibilities. In Questionnaire C, the items deal with teacher attitudes as to characteristics of the successful teacher. In January 1968, these instruments, with appropriate modifications, were administered to all administrative and counseling personnel in the district. Questionnaires B and C will be readministered to teachers late (About May 1, 1968) in the school year. In the analysis of these data, the staff will look for changes in the attitudes and expectation of the inexperienced teachers new to the district, experienced teachers old in the district, and administrative and counseling personnel. Judgments as to the adequacy of the data-gathering procedures and the general design of the project will be made.

4. Occupational Attitudes of Teachers

R. W. Heath

The purpose of the occupational attitudes project is to investigate the formation of occupational attitudes among teachers, their relation to dominant social values, and the consequences of group differences in such attitudes. The universe of attitudes toward one's occupation may be represented by a set of attitudinal dimensions (e.g., the occupations's conformity demands, opportunities for creativity, social contribution, financial reward, status, and security). Through the use of factor-analytic and scaling techniques, attitude scales corresponding to such dimensions are being developed. Each attitudinal dimension, and its corresponding set of items, was selected as being psychologically relatively distinct.

Once these attitude scales are developed, it will be possible to study occupational attitudes of teachers as they progress from candidate-trainee to experienced teacher. It may be feasible to identify attitude profiles as functional and dysfunctional. The implications for teacher education seem evident. Comparisons of different types of teachers (elementary vs. secondary, social studies vs. science, undergraduate education major vs. subject-matter bachelor's degree, etc.) might be useful. It would also be of interest to compare the occupational attitude profiles of teachers with those of other occupational groups. Because of the similarity in professional education requirements, engineers might be a worthwhile comparison group.

Members of the Center staff and Professors Meyer (Sociology) and Weigle (Communications) were consulted, some preliminary research into the relevant literature was undertaken, and work began on the first major task in August 1967.

The initial step involved selection of the attitudinal dimensions and the construction of item stems. Sixty items were constructed--ten in each of the six attitudinal dimensions. The attitude items were pretested with a class of 28 ex-public school teachers enrolled in Education 315 (Cultural Transmission). The items were presented in random order in the following form:

My occupation:

1. Offers good job security. 1 2 3 4
⋮
9. Challenges one's creative abilities. 1 2 3 4
⋮
52. Is not well respected. 1 2 3 4

where 1 signified strongly agreed with the statement; 2 undecided but probably agreed; 3 disagreed; and 4 strongly disagreed. The total score per scale could range from 10 (strong agreement with all 10 items) to 40 (strong disagreement with all 10). Results of this pretest are given in Tables 1 and 2.

Table 1

Summary Statistics of the Six Scales

	Scale	Mean	St. Dev.	Skewness	Kurtosis	Alpha
1.	Conformity	21.1	4.97	0.02	-0.81	.75
2.	Creativity	31.2	7.09	-0.56	-0.19	.92
3.	Social Contribution	38.3	2.98	-2.66	6.18	.74
4.	Financial Reward	21.4	6.77	-0.11	1.02	.87
5.	Status	26.0	7.41	-0.44	-0.81	.90
6.	Security	38.7	3.22	-3.00	8.18	.88

Table 2

Scale Intercorrelations

Scale	1	2	3	4	5	6
1. Conformity		.17	.09	.20	.06	-.19
2. Creativity			.46	.02	.25	.17
3. Social Contribution Contribution				-.23	.14	.54
4. Financial Reward					.39	-.16
5. Status						-.11
6. Security						

These results were obtained through use of a specially developed SCRDT program.

At present, item data are being used as a basis for item revision. The revised 60 items will then be incorporated in an instrument for further pre-testing. Work on an annotated bibliography is being continued.

5. Case Studies of Teachers in the Elementary School Behavior Setting

R. L. Warren

This project is aimed at comparing teacher behavior in schools of the new open variety with teacher behavior in schools organized and operated along more traditional lines. Innovations in structural arrangements, teaching responsibilities, scheduling provisions, and pupils' class assignments are widely considered to make school experience more meaningful for teachers and pupils. It is the aim of this project to accumulate evidence concerning those teacher behaviors that are modified by such innovations and those that are constant through such changes.

The analysis is being made, first, through a case study of a school with a traditional structure and organization. The primary method of gathering data is field observation, supplemented by interview and questionnaire methods, tape recordings, and photographs. Although the project's funding began in July 1967, observations were begun in the Spring of 1967. During the summer months, while the school was not in session, the teachers were interviewed and questionnaires were developed for use with teachers and parents. In addition, data were gathered at the school district level on the background and evaluation of the teachers and the district policies affecting the responsibilities and performances of teachers.

During the past six months, observations of school life have continued, with particular emphasis on delineating teachers' patterns of interaction over a period of time with pupils, colleagues, principal, and parents. These patterns, it is expected, will provide highly appropriate data for making comparisons with a school of a different type.

d. Facilities and Research Services

1. Intern Data Bank

F. J. McDonald

The general purpose of the Intern Data Bank was to collect and store systematic data on intern teachers at the beginning of their training, at the end of the summer period of that training, and again, later in the year after they had had teaching experience. The data were to be used to assess the effects of training and experience on teaching performance. The project's large number of specific purposes are represented by each kind of study that is developed out of the data in the bank.

The data were collected in such a way that a number of purposes might be served. For example, personality test data were gathered so that differences in personality could be related to differences in teaching style and responsiveness to training. Similarly, data were collected on both secondary and elementary school intern trainees, so that the effects of roughly similar types of training on each kind of intern could be compared.

The Data Bank is a collection of items of information about 200 teachers: 160 secondary-school intern trainees, and 40 elementary-school intern trainees. This collection will be used in a considerable number of studies, each designed to answer specific questions about teacher personality, teaching style, the effects of training procedure, and the like.

Nature of the Data

At the beginning of the summer session, secondary-school intern trainees at Stanford University and elementary school trainees at San Jose State College, taught a 40-minute lesson which was videotaped. Both groups repeated this procedure at the end of the summer training session, and will do so again in May 1968. Intervening between the first and second teaching was the summer-school training experience. Intervening between the second and third teaching is the year of internship experience.

At Stanford, 40 social studies interns and 20 English interns taught preset lessions, i.e., one in which the content was specified. These interns were given several pages of content on the money system of the United States, a list of the objectives of the lesson, and a copy of the test which the students were to take at the end of the lesson. They were told to prepare a lesson which would achieve the specified objectives. Four such lessons were developed for social studies interns and randomly assigned to interns; two such lessons were given to English interns by randon assignment. At San Jose, all 40 interns taught the social studies lessons used by the social studies interns at Stanford, with adaptations to make the tests appropriate to the age level of the children being taught.

Each intern's class had 20-25 students, randomly assigned. At the end of the 40-minute teaching period, students who had received a preset lesson took a 20-item achievement test on that lesson. Both these students and students in other classes also rated their teacher on two scales: (a) the Pupil Inventory, on which they indicated how well they liked the teacher and whether the teacher had used some of the technical skills on which they were subsequently trained, and (b) the Stanford Appraisal Guide.

The interns also took a series of personality tests: (a) the Kerlinger Test, which assesses "progressive" vs. "traditional" attitudes concerning education; (b) the Educational Opinion Inventory, which assesses opinions on 300 items dealing with educational issues and practices; (c) tests of verbal fluency and imagination; (d) inventories of preferences for different types of desk-table-and chair teaching arrangements; (e) an extensive questionnaire on the intern's background and the decisions that lead to his preparing to be a teacher; and (f) measures of verbal ability. Each intern, when he had finished his teaching session, was requested to give his reactions to the teaching experience.

In short, the Data Bank includes data on teaching behavior recorded on videotape; pupil achievement; pupil reaction to the lesson; intern reaction to his own teaching of the lesson; pupil ability; intern ability; and intern personality and life-history.

In addition, in some classrooms, 35mm time-lapsed photographs were taken of the class as the intern taught the class; in some of these rooms, such photographs were also taken of the intern teaching in that room. Interns at Stanford, on the day preceding the 40-minute lesson, also taught a 5-minute lesson. The purpose of gathering these latter data is to determine how well the teaching performances in the short teaching sequence predict or correlate with those in the longer sequence.

All test data have been recorded and placed on magnetic tape in the Stanford Computer Center, and this "Data Bank File" is now readily accessible to users. Some codings and ratings of the videotapes have been made; as these are made, they are also added to the Data Bank File. Eventually all of the data collected and generated by various analyses will be inserted into the Data Bank File.

Studies in Progress

Three studies of the data are now in progress. In one study, 24 teachers have been selected--12 judged to be the most effective and 12 the least effective on the basis of the adjusted achievement scores of their students. In this study, the teachers' videotaped performances are being coded and scored on a variety of technical-skill variables to see which of these variables distinguishes between the most and least effective. In a second study, utilizing the same sample of teachers, the 12 most and 12 least effective teachers are being compared in terms of the structural and syntactic characteristics of their lessons. In a third study, teaching behaviors are being rated on the degree to which they reflect or embody inquiry-oriented teaching methods. This study will reveal the correlation between scores on measures of authoritarianism and traditionalism, degree of use of inquiry-oriented teaching behaviors, and amount of change across training sessions in the direction of using these teaching behaviors.

The Data Bank was designed to permit studying the development of skill over time, comparing the effects of using preset versus non-preset lessons, comparing performance in short teaching sessions with those in longer ones, assessing responsivity to training, and assessing the long-term effects of training. These studies can be made only when all of the tapes in the Data Bank have been systematically rated, a process which should be finished by August 1968.

It should be noted, however, that the videotapes of these teaching performances are being preserved so that they can be rated or analyzed according to any schema chosen or developed in the future. As a resource for research,.the Data Bank permits looking at teaching performances from any definable perspective.

Dissemination Activities

To encourage use of the Data Bank, the Project Director has spoken to several groups, describing the data and the uses to which they might be put. Individuals interested in using the Bank have met regularly once a week during the Winter Quarter to organize the Bank and to prepare for the collection of data during May 1968. Invitations to attend these meetings have been extended to members of the Stanford School of Education faculty, who have been encouraged to invite students to attend if they are interested in problems to which the Data Bank may be relevant.

A periodical news letter will be disseminated widely to inform individuals in the Stanford community and at other universities and research centers about the Data Bank. A continuing seminar will be developed on the problems of teaching that can be studied by utilizing Data Bank information. It is also planned to have several research assistants spend their time running studies with the Data bank information. Such studies will be reported to the profession as soon as feasible.

A paper on the subject of the Intern Data Bank was presented by Richard Krasno and Dwight Allen at the American Educational Research Association meetings in Chicago in February 1968.

2. Unit on Film Production

D. G. Coffing

A brief summary of the work of the Unit on Film Production, as of the end of the Winter quarter, is given here. In this listing, R = Research, D = Dissemination, and number of films in the project is indicated. All films are 16mm.

Completed Films

R	1	Teachers and Classes, 40-minute, black and white. On classroom discipline situations. Now in distribution, 6 copies.
R	20	Micro-teaching Conference-made Technical Skills Models, 5-minute, black and white. Copies distributed to Conference participants. Excerpts are being prepared for teacher training multi-media package.
D	1	Technical Skills of Teaching, 30-minute, color. Frederick J. McDonald presents rationale and examples of models. Now in distribution, 3 copies.
R	32	Data Bank Storage Films, 40-minute, black and white, each on interns' teaching behavior. Now in storage pending analysis.
R	32	Data Bank Time-Lapse Films, 40-minute, black and white. Each on an intern's teaching behavior. Now in storage pending analysis.
D	1	Micro-teaching: What's That? 30-minute, color. On micro-teaching from the perspective of an intern. Now in distribution , 3 copies.

Films Near Completion

D	1	Role-Playing, 20-minute, black and white. On role-playing as a teaching technique using a classroom setting. One copy in use.
R	1	Role-Playing, 60-minute, black and white.
R	36	Math Presentation Mode Stimuli, 5-minute, black and white film. 12 lessons presented 3 ways each. Ready for answer print.
R	2	Classroom Interruptions Films, 5 and 8 minutes, color. Showing teacher responses to student interruptions. Production cancelled.
R	1	Response Repertory, 10-minute, color. Animation cartoon about classroom interactions between teacher and student. Production cancelled.
D	1	Center Slide Film, 20-minute, 2x2 slides with synchronous sound on Center activities. Completed, ready for use.

Several types of film utilization have currently been under discussion: research films for the aptitude-treatment interaction project, the development of filmed tests, analysis of film language and conventions, extension of the technical skills project, etc. The rest of the academic year has been devoted to completion of current projects and planning future film use in the Center.

Dissemination Activities

Microteaching: What's That?, made for and used at Microteaching Conference, School of Education, Stanford University, Summer and Fall, 1967.

Role Playing (1 copy) was used by:

Teacher Education Council
Mineola, New York

Idaho State Council of the
Social Studies

Association for Childhood
Education International
Washington, D. C.

University of California
at Riverside

Stanford University
School of Education

Association for Supervision and
Curriculum Development
Arizona

University of California
at Berkeley

Teachers and Classes (6 copies) was used by:

Grinnell College, Iowa

Montclair State College
New Jersey

Creighton University
Nebraska (twice)

University of Nebraska

Fremont High School,
California

Peace Corps
Washington, D. C.

University of Manitoba

Towson State College
Maryland (twice)

San Jose State College

University of South Dakota

Northern State College
South Dakota

Homewood-Flossmoor High School
Illinois

Plateview, Nevada

University of Missouri

Colorado State College (twice)

Baltimore Public Schools, Md.

Antioch College, Ohio

College of the Immaculate Conception
Kansas

Ft. Hays State College
Kansas

Jefferson County Public Schools
Colorado

Centerville,Ohio Public Schools

St. Mary's High School, Nebraska

Central Catholic High School
Grand Island, Nebraska

Los Altos Union High School
Mt. View, California

Directory of School Relations and
Service
New York City, N. Y.

Brandon University
Manitoba, Canada

Mr. Gene Burnett
Nashville, Tennessee

Freeport Public Schools
Illinois

Washington State University

University of Illinois
Urbana

City of Baltimore
Baltimore, Maryland

Research Lab., Inc.
Northfield, Illinois

St. Ludmila School
Cedar Rapids, Iowa

Northern Illinois University
Dekalb, Illinois

New Trier Township High School
District
Northfield, Illinois

Antioch Community High School
Antioch, Illinois

West Salem Area High School
West Salem, Wisconsin

East Leyden High School
Franklin Park, Illinois

Morningside College
Sioux City, Iowa

West Virginia State College
Institute, West Virginia

Mayfield School
Pasadena, California

Towson State College
Baltimore, Maryland

Baltimore City Schools

Cheyenne Mountain High School
Colorado Springs, Colorado

University of Minnesota

Center for Exemplary Instructional
Systems
Houston, Texas

Evanston Public Schools
Evanston, Illinois

University of Maryland
College Park, Maryland

3. Unit on Research Methodology

J. D. Elashoff

The Unit provides consultation services on research design and data analysis in the Center. During the past year the Unit has been reorganized and now handles the details for all of the Center's computer-based data processing.

The staff presently consists of consultants (Drs. Robert Heath, Janet Elashoff, and Richard Lindeman), a full-time programmer (Robert Proctor), two research assistants (half-time), two data processors (half-time), a secretary, and part-time keypunchers.

The Unit has acquired an IBM 2741 terminal directly connected to the Stanford Computation Center's IBM 360/67. This terminal allows the Unit to provide more efficient service for computer data processing. The Unit is currently reviewing the cost and efficiency of various types of desk computers.

Robert Proctor has developed three major general-purpose computer programs: (a) a program which prepares plots, histograms, and simple regression analyses; (b) a program which reads text, recognizes words, counts sentences, and provides frequency tabulations of specified words, dictionaries, word lengths, and sentence lengths; and (c) an item-analysis program which serves as a general tool for the analysis of dichotomous or weighted items in computing coefficient alpha and Hoyt's analysis of variance for each scale. A social science program library developed for the 1620 in Fortran II has been converted for use with the 360/67.

A central records and accounting system has been developed to monitor the progress of projects currently being handled by the Unit and to provide up-to-date billing information on data analysis expenditures. As this system develops, a complete history of consulting and analysis activity on each project will become available.

A review of the Unit's assistance with various Center projects and affiliated projects during the past year follows. (Names of investigators are indicated in parenthesis for the affiliated projects.)

1. Intern Data Bank. The Unit has been attempting to set up a data bank file for the data collected on Stanford and San Jose teaching interns during the Summer of 1967. The staff have been assembling the data, preparing code books, assembling specimen sets of the tests used to collect the data, and planning the steps necessary to convert the data into readily accessible computer storage.

Some analyses involving Data Bank information are now in process. The Unit is devising a procedure for obtaining reliability information on the Stanford Teacher Competence Appraisal Guide, which was used to evaluate intern performance; a one-classroom sample has been selected for preliminary analysis. The Unit has discussed the appropriateness of various reliability measures for ratings of the 40-minute Diagnostic Lesson. The Unit has located a computer program with sufficient capacity to factor analyze intern responses on the 300 items of the Educational Opinion Inventory and has suggested that response distributions for the items be investigated as a preliminary step.

2. Technical Skills in Teaching--General. For the San Jose Project, the Unit has been assisting in the assessment of the reli-

ability of ratings of higher-order questioning and in the preparation of preliminary analyses of time and treatment effects. Also, the Unit has assisted in estimating the reliability of rating scales and preliminary analysis of time and treatment effects in the comparison of teacher and student behavior training models.

3. Technical Skills of Teaching: Explaining Behavior. Intercorrelations of achievement scores for Thailand and Yugoslavia lessons, adjusted for scores on the Israel lesson, were obtained for classes split on an odd-even basis.

The Unit has assisted with the conversion of various word dictionaries to a general format. A general computer program was developed to read text, recognize words, count sentences, and provide frequency tabulations of specified words, dictionaries, word lengths, and sentence lengths.

The Unit is helping to plan the use of data collected on Stanford interns to generate and evaluate teacher behaviors which seem to discriminate among teachers with under- and over-achieving students. Reorganization of Data Bank file on student achievement scores was necessary to begin work on this project.

4. Technical Skills of Teaching: Foreign Languages. For the study of foreign language grammar drills, their order of presentation in relation to their explanation, the Unit assisted in planning and carrying out the analysis of the data to determine treatment effects as differentiated from class effects. For the study of methods of improving achievement in foreign language through programmed training in selected skills associated with language aptitude, the unit assisted with analysis

of differences in language achievement between experimental and control groups.

5. Role-Playing. The data bank for the role-playing project has been set up, and a language analysis program has been written to evaluate certain item responses. The Unit is now assisting in planning the analyses to be carried out.

6. Teaching for Divergent Thinking. The Unit has assisted with the analysis of classroom behavioral data for children receiving and not receiving computer-assisted instruction (CAI). A factor analysis of eighteen variables based on direct observation of children in the classroom setting resulted in the identification of four factors which were consistent with a priori categories of observed behavior. Analyses of variance were performed on each of these four measures as well as on achievement. Correlations between all behavioral measures and measures of intelligence and achievement were computed for several subgroups of the data. Currently scatter plots of reading achievement and IQ are being made for high and low ability CAI and non-CAI groups.

7. Change in Behavior of Children Enrolled in Two Types of Head Start Classes. (Lillian Katz): The analysis of the data from this study involved testing for the existence of different teaching methods in two groups of three classrooms and for changes in the behavior of children in these groups. Members of the Unit advised on the appropriate techniques and assisted with the analysis. Several special-purpose programs were written, including one to subdivide the degrees of freedom in a contingency table for the analysis of nominal variables.

8. Aptitude-Treatment Interaction Project. (Richard Snow): The Unit assisted with the reanalysis of five studies of aptitude-treatment interaction. Discussions of alternative ways to investigate aptitude-treatment interactions are now taking place. A Unit consultant has advised on the assumptions underlying the use of analysis of variance for repeated measures designs.

9. Divergent Thinking. (Patricia Engle): Correlations among subscores of a scoring system for the Draw-A-Man Test were computed.

10. Feedback on Attending Behavior. (Norman Dimmit): The Unit assisted in the performance of five-way and three-way analyses of variance with repeated measures on two variables. Correlational studies, reliability studies, and a components of variance analysis were made.

11. Attending Behavior and Feedback. (Glenn R. Houde): The Unit has carried out analyses for the study of feedback to teachers of objective measures of pupil attention in the classroom.

12. Relationships between Measured Mental Ability and Personality Characteristics and Performance in Independent Study (Jack McLeod): A consultant from the Unit advised on the redefinition and rescoring of several variables. Reliability studies and multiple regression analyses were performed.

13. Pupillometry in the Study of Teacher Attitudes. The Unit assisted in the development of a pupillometric program package. Part I digitizes measurements such as pupil diameter from film using the optical scanner, and Part II provides analysis routines for the measurements.

14. *Organizational Context of Teaching*. The Unit has been assisting in preliminary analysis of the problem-solving behavior of four- and five-teacher hierarchical and collegial teaching teams.

15. *Occupational Socialization of the Teacher*. The Unit discussed with the staff of the Occupational Socialization Project the analysis of the three instruments used on teachers of the Fremont Unified School District. Suggestions were made for dealing with the nonresponse problem in future use of these instruments. The Unit is now beginning to tabulate responses to each item analyzed by several biographical categories of teachers to assist in the planning of further analyses.

16. *Principals Information Project 1968* (Mildred Jones). The Unit has assisted in the revision of the major instrument and in devising an appropriate sampling plan.

Dissemination Activities

J. D. Elashoff's publications were as follows:

1. "Analysis of Variance with Missing Data (with specific reference to BMDO5V)" Research Memorandum No. 14.
2. "Regression Analysis with Missing Data" in *Computer Analysis of Complex Social Science Data Bases*. New York: Wiley, in press.
3. "On the Choice of Variables in Classification Problems with Dichotomous Variables" (with R. M. Elashoff and G. E. Galdmon). *Biometrika*, 1967, 54, 668-670.
4. "Optimal Choice of Rater Teams: I. Theory" *Psychometrika* (in press)

4. Videotape Service Unit

R. H. Pinney

During the past year, the Videotape Service Unit has been used by several staff members pursuing a wide variety of research questions. The Unit services has made possible more efficient and meaningful research activities through the process of recording and feedback and through the subsequent storage of the data in a variety of forms.

Major Activities

The major activity of the Unit during the first part of last year was related to the various studies of technical skills. Other services were provided for various pilot studies conducted by the Center in addition to the extensive Intern Data Bank project. As reported elsewhere, the Data Bank project entailed the videotape recording of 170 interns in each of two 45-minute teaching situations -- one in June and one in August. A third set of 170 recordings is scheduled to be made in May 1968 as part of the third phase of data collection for the Data Bank. In addition to the 340 recordings made in connection with the Data Bank project this summer, an additional 1500 five- and twenty-minute recordings were made in conjunction with the microteaching clinic. Most of these were related to studies of technical skills.

During the past academic year, approximately 500 videotape recordings have also been made in about 45 secondary schools in the San Francisco Bay area. These recordings were made in conjunction with a variety of research projects conducted by the Center, including some follow-up data collection for the Data Bank.

Equipment

The equipment used for these recordings and playbacks (and other services) consists of six complete portable videotape recording units, plus a supply of individual components that serve as replacements when repairs are needed. The portable units are transported from school to school, from the School of Education to the Center, etc., in two light delivery vans, equipped with folding ramps, and two small lightweight trailers. The Unit is capable of making ten simultaneous videotape recordings.

Dissemination Activities

Also during the last year the Unit has served approximately 55 visitors and has handled numerous requests for information regarding the operation and equipment of the Unit. The project has also provided informal consulting services for staff members of the School of Education, Stanford University as a whole, other universities, and public schools. The experience of the staff of the Videotape Service Unit continues to be of value to the Center's research projects by increasing the efficiency and sometimes the effectiveness of many of these projects. Also the technical expertise of the Unit's staff has assisted the Center's staff in non-TV, but technically related, areas.

Staff

The staff of the Unit consists of two research assistants serving as co-directors. Typically, the junior member deals with the scheduling of recordings and operators, while the senior members deals with the overall planning and organizational dimensions of the Unit's operation. In addition, approximately 15 to 20 undergraduate operators working from five to 25 hours per week, depending upon class load and research demands. During the past summer, ten to 15 full-time operators were hired to set up and carry out the Microteaching Clinic and the research activities conducted during the clinic.

Problems

As in the past, one problem the operation has encountered this year has been a continued shortage of tape. There is a definite need to be able to store and maintain data recorded during one study and at the same time to record data from new studies on new tape. Some potentially valuable data has been sacrificed in order to proceed with new projects. In short, for every study there should be a separate allocation for tape, so that taped data can be saved as long as seems desirable.

Also, as indicated before, the physical facilities of the Videotape Services Unit are somewhat limited; its floor space is so inadequate as to cause a significant loss of efficiency and effectiveness. Related to this problem is the fact that the Videotape Services Unit's location is not near the Center's main offices, making communication and consultation with staff members somewhat difficult.

The Unit's staff is developing a system intended to improve the quality and usability of the audio portion of recordings.

Overall Evaluation

In general, the videotape operation has been valuable. First, the ability to record and store data on videotape has allowed the Center to carry on various research projects at the same time. At present, over 1800 rolls of videotape are in storage, containing data gathered at various times, for various purposes, and usable in various ways. These tapes will be analyzed and coded in months to come by different people for different research purposes. Second, the increased use of the videotape services in research projects indicates a growing realization that this medium has advantages for research in teaching. The staff believes that it has only begun to tap the possibilities offered by this technique. Third, the increased interest shown by other colleges and universities in the possibilities of videotape operations also indicates that this medium is perceived as valuable in teacher education as well as in research in teaching.

II. Research and Development Programs for FY'69 and Subsequent Years

a. HEURISTIC TEACHING

Although the idea that man must adapt to social and physical change is widely accepted, some of its consequences have not been recognized or fully accepted. If the ability to adapt to complex life situations is as critical as it appears to be, it is important that a substantial portion of educational effort should be devoted to developing individuals who are adaptive, flexible, and inventive. That our educational energies are not so devoted is abundantly clear. Although society is changing rapidly in many ways, the schools are changing very slowly.

The Inadequacy of Didactic Teaching

Teaching style is probably the most static aspect of schooling. Teachers teach today in much the same way as they have for generations. The basic style is didactic, with the teacher dispensing information to passive pupils. At regular intervals, the teacher examines the children upon how much of this information they have absorbed and retained. It is the teacher who asks questions, rarely the pupil. The structure of the answers is predetermined by the context in which the questions are formulated; only infrequently does a child's schooling permit him to discover problems. The answers are known; if they are not known by the teacher, then certainly they can be found in a book. Occasionally these stretches of information-dispensing and receiving are broken by moments of creative activity. But, more frequently, the didactic method continues uninterrupted, accepted on the assumption that knowing "these things" is important.

It is not necessary to prolong this jeremiad on the current state of teaching. Over the years, great teachers have deplored the paucity of imagination and the sterility of the methods used in most teaching, but even the fervor of the Progressive Education movement in the United States accomplished little.

The Computer and Audiovisual Revolutions

What reasons are there to believe that a change can now be wrought? The answer is that a new element has been added to the social forces impinging on the schools, namely, the computer and audiovisual revolutions. Teachers' didactism has persisted because there was no substitute for it. Children needed to learn information; the teacher was the guide to and the dispenser of that information. Not even the widespread availability of books changed this system.

The computer and various audiovisual media make possible a better information dispensing system. In two decades or less, computers will be integral components of an electronically-based educational system. These components and audiovisual systems will be used extensively as unit costs go down and comparative effectiveness is demonstrated; their educational validity is already well enough known to warrant our predictions.

Even if one were not sanguine about the development of media and computer-assisted instruction, he must recognize that the world has changed substantially because of the widespread availability of information. He has only to turn on a TV set of pick up a magazine or newspaper to have available more information than his grandfather may have had in a year, He has a sense of immediacy, of closeness to events as they are transpiring. He need not imagine what people look like; he sees them on television and in pictures in magazines. Pictorial journalism, whatever the media used, has opened up to him a world of symbols, images, and colors.

In such a world, how does one know what is worth knowing? The richness available forces a choice of what to read, watch, and remember. Such choices require principles by which one can make the decisions that lead to selection.

The didactic teaching style helps very little in enabling one to develop such principles. The didactic method is but another aspect of the information flow. The very technology that facilitates communication tends to enhance and stimulate the didactic processes in schooling. A teacher can now turn on TV in the classroom, bringing into it a better dispenser of information than he is. The day is not distant when children will go to computer terminals for access to vast libraries.

The computer and electronic revolutions have had another consequence, probably more serious. They are the symbols of depersonalization. Only a relatively few sophisticated members of our society are aware of the extent to which the machines are controlled by men. The vast majority see the computer as an impersonal force capable of making decisions for and about them, and one over which they have relatively little control. Similarly, despite all the claims about the potential educational value of television, disparaging references to its programs and processes are frequent. In our society, the machine is often seen as a threat to one's sense of identity.

It would be simple-minded to claim that the didactic teaching style has rendered human beings helpless in the face of profound technological change. It would be equally wrong not to recognize that that style, now the dominant approach to the inculcation of knowledge, does not engender ways of coping with profound social changes now occurring.

Alienation of Youth and Didactic Teaching

Only the schools can provide a wide variety of approaches to learning. If the learner's reception of information is likely to be facilitated by technological developments, what are the likely consequences of this facilitation? Will we also facilitate the acquisition of passivity, indifference, and alientation? That these are not unlikely outcomes seems apparent when we consider the mood of the present generation of high school and college students. Large numbers of them are alienated from their world. Others are in active rebellion against a social system which they think regards them as statistics in manpower counts rather than human beings. They charge that the educational system is forcing upon them a way of life whose values they cannot accept. They are demanding new forms of education which will help them develop as persons.

Although it has many causes, the alienation of large numbers of middle-class and minority-group youth attests to widespread dissatisfaction with American education. Many adults recognize the disparity between what the schools teach and the needs of youth, but it is the students who have pointed to the inadequacies of the way in which they have been taught. They attack the passivity of their role, the lack of involvement of their teachers in the teaching process, their exclusion from the decision-making processes which determine the nature of their education.

Vague as some of these problems seem, the prevailing mood is unquestionably to demand and provoke change in the nature of education. At present, the discontent is more apparent than the nature of the problem or the most effective way to solve it.

A decade ago, dissatisfaction with education took the form of criticizing what was called the "quality" of education. Quality was synonymous with traditional conceptions of academic achievement. The resolution of this dissatisfaction took the form of innovations in the curriculum, such as new mathematics and science programs, and greater emphasis on academic achievement. One consequence of these changes was an enhancement of the didactic mode of teaching. The good teacher became the teacher capable of increasing acquisition of subject-content.

Disadvantaged Children and Didactic Teaching

This emphasis on academic achievement occurred about five years before another profound change in American society--the explosion of the effort of the Negro and other minority groups to find an equal place in our society. Nowhere is the inadequacy of the didactic mode of teaching more apparent than in the ghetto schools. Many have noted the irrelevance of the curricula of these schools; few have observed that their teaching styles reinforce those very characteristics which help to maintain the inferior status of the minority-group member.

The didactic mode requires much passivity of the student. It encourages an authoritarianism of the book, where the printed word becomes the standard of truth. Receptivity to it requires detachment and delay of personal gratification.

Again, it would be too simple to blame the problems of minority youths in the schools on the teaching style to which they are exposed. It must none the less be recognized that this teaching style contributes to the alienation of minority youth from schooling.

Heuristic Teaching: The Necessary Supplement

Heuristic teaching refers to styles of teaching which emphasize the development of self-initiated and self-directed pupil learning; which stress the pupil's discovering rather than absorbing knowledge; which place the student in the role of inquirer; which aim at heightening the relevance of school to the pupil's life; which are concerned with the emotional and social development of the pupil as well as with his cognitive growth. Teaching in the heuristic mode represents no one style of teaching behavior or activity. It may be characterized as imbued with the spirit and mood of inquiry, critical skepticism, invention, imagination, and enthusiasm for learning. It treats students as persons who can produce knowledge and understanding. It is revealed in sets of beliefs about the way in which knowledge and understanding are integral to personal development and the meaning of existence. It may be the essence of the varied styles of great teachers who inspire students to seek understanding.

We will not attempt here to describe in detail all that is meant by heuristic teaching. One of the purposes of the research described is to develop such descriptions of these teaching styles. None the less, one way to understand more clearly what is implied in this concept is to look at heuristic teaching from the perspective of the teacher and then from the perspective of the student.

From the Teacher's Perspective

Heuristic teaching styles will take many forms. We here decide the characteristics of heuristic teaching as we now see them. The concept will change as we study this teaching style in practice. Also, whether the teaching style actually produces the effects described is an empirical question. These statements should be regarded as hypotheses.

The teacher himself will be an active inquirer, making the learning process itself a subject of his inquiry. Teaching will be the means by which the teacher himself learns; he will be as actively engaged in learning as his students.

He will stress openness of inquiry. He will not make arbitrary distinctions between knowledge and living, between understanding and being, between social importance and personal relevance. He will help students seek knowledge and understanding; he will not think of teaching as giving knowledge and understanding.

The character of his relations with students will also be changed. He will appeal to the authority of free inquiry rather than to the authority of persons. He will not impose his greater knowledge or deeper insight on students, but will rely on their perceptions of his competence to stimulate them to seek him out as a guide.

From the Student's Perspective

The characteristic behaviors of students taught with heuristic teaching styles will also take many forms. The student will be an active inquirer rather than a passive recipient of knowledge. He will see the process of learning as a way of achieving his most significant personal goals. His definition of his goals, of what in life will have significance for him, will emerge out of the processes of learning. He also will not make an arbitrary distinction between being and learning, between personal relevance and education, between meaning and personal significance.

He will assume responsibility for his learning. He will not need to be goaded to learn, since the significance of learning will have become intimately personal for him. He will view education as a means of achieving his goals. He will see teachers not as threats to his personal integrity but as helpers in achieving and enhancing it.

Admittedly, these descriptions represent ideal characterizations of teachers and students. Realists, familiar with today's schools, will despair of achieving a system in which there are large numbers of such teachers and students.

The purpose of the Center's research and development in this problem area is to initiate progress toward this goal. It will not be achieved in the immediate future. But it can be attained within a reasonable span. For those who doubt that changes toward such a goal can be wrought, we point to the technological and social revolutions occurring in our society. These potent social forces can be made to help in the development of schooling that emphasizes heuristic teaching.

Heuristic Teaching and the Open School

The character of the American school must change in the coming decades if education is not to be overwhelmed by the new computer revolution, if education is to contribute to the development of the most significant aspects of childrens' lives. The experience of the past decade has made it obvious that curriculum innovations do little to produce profound changes in schooling. The most imaginative innovation in curriculum can be subverted into a pedestrian analysis of subject matter by a teacher who does not understand its purposes or possess the motivation and skill to teach toward its goals. A set of experiments designed to stimulate students to inquire becomes merely another set of exercises in the hands of the teacher insecure with inquiry. Comprehensive schemes for organizing subject matter are of little interest to the teacher with little zest for learning or skill in making learning a challenge rather than a chore.

Even if many teachers were skillful and motivated enough to use heuristic teaching styles, the present organization of the schools would interfere with their use. Teaching functions are undifferentiated in present-day schools, so that one teacher must perform many functions. Even though a teacher may be skillful enough to perform them, the most demanding--heuristic teaching--is likely to be slighted because the others consume so much of his energy. Moreover, the present organization of teaching does not permit teachers unskilled at heuristic teaching at avoid it, any more than it permits those unskilled at didactic teaching to avoid it.

Also, the prevailing emphasis on didactic teaching has created a generation of administrators and parents who equate learning with the absorption of information. Any change in teaching styles, particularly when it places greater responsibility on the student for his own learning and stresses inquiry, will require changes in the attitudes of both administrators and parents.

Two kinds of changes are required. First, heuristic styles of teaching must be introduced into the schools to supplement the didactic mode.

Second, schooling must be organized to facilitate both the consequences of the computer revolution and the introduction of heuristic teaching styles, creating what we have called the "open school."

Research and Development Goals

The primary goal in this problem area is to create and promote the use of new teaching styles, called here "heuristic teaching." This process of creation and promotion will be achieved by describing the pupil behaviors to be elicited and fostered by heuristic teaching styles; describing actions which elicit the desired pupil behavior; creating strategies for educating teachers to use heuristic styles; initiating school programs where these styles are used.

Another goal in this program area is to find ways to develop the innovative teacher. This goal will be achieved by identifying the systems and processes of change which are, or could be, mediated by teachers; developing systems for selecting and training teachers who will be agents of educational change; installing these teachers as leaders of teaching teams that will be the nuclei of the staff of the open school; developing training strategies to involve administrators in the creation of the open school and in the promotion of heuristic teaching styles.

Problems implicit in these goals must be attacked in a coordinated way. This program area will be oriented both to the innovation of heuristic teaching styles and to the study of the process of innovation itself. Heuristic styles will constitute a major innovation in a school because they are not merely techniques but comprehensive ways of teaching which permeate many teaching methods. They will change the teachers' relation to students in radical ways. Adopting this form of teaching requires the support of both administrators and parents. We must see how the teacher can innovate within the heuristic teaching styles while we are studying the styles themselves.

Research and Development Strategies

This program will have two major research and development foci. One focus will be the effects of heuristic teaching on pupil behavior, and those variables which produce the kinds of pupil behavior desired. The second focus will be methods for producing heuristic teaching styles in teachers.

These two foci will come together in time, in common research sites, and in integrated projects. For example, a series of experimental analyses of the effects of certain variables on pupil behavior is planned for the coming year. They will provide a basis for describing teaching behaviors which will elicit specific pupil behaviors. In the following year, training studies will be conducted to assess how these teaching behaviors can be acquired and used. During this period of study, the effects of using them in a comprehensive way in regular classrooms will be analyzed and the results of these analyses will then be fed back into a second set of experiments for further analysis.

The work on training teachers to use heuristic teaching styles will not be postponed until the experiments on pupil behavior are done. We have general ideas and hunches about the kind of teaching behaviors likely to be components of these styles. Studies will be made to find methods of training teachers to use these behaviors and to study their effects on pupils. These studies, in turn, will lead to experimental studies of effects on pupils.

Thus, the two foci of investigation will come together--the studying of effects on pupil behavior will lead to teacher training studies, and the study of teacher training will lead to further analyses of effects on pupils. This strategy, described in the last Annual Report, takes the form here of an integrated program of research on the acquisition and effects of heuristic teaching styles.

Two Methodologies

Two kinds of research and development methodology will be employed in this program area. As in previous years, a number of carefully controlled experiments will be conducted on the effects of teaching styles on pupils and on the effects of teacher training strategies on teachers. The goal of this research is to describe carefully and in detail those variables likely to produce specific effects on pupils or teachers.

This experimental work would be of little practical value, however, if its results were not applicable in classrooms by teachers. Therefore, we are proposing to create several on-going classroom programs. The purpose of these programs will be to help teachers in regular classrooms learn and use heuristic teaching styles. We will field test the procedures developed from our experimental studies. We will also use these field sites to generate ideas about variables that might be studied experimentally. Thus, we will have a system in which experimental work affects teaching and in which careful observation of classroom practice guides experimental work.

Field Studies

We propose to use five classrooms from schools with high proportions of minority group youth and five classrooms from middle-class schools. We will work closely with their teachers to study the innovation of heuristic teaching styles. These classrooms will be our observational site for assessing the effects of heuristic teaching styles on teachers, students, administrators, and parents. We do not propose any tightly-controlled experimental studies of the activities in these classrooms, except as occasional substudies.

The research team in this problem area will be the nucleus of a staff which meets with these teachers regularly and guides the observations made in these classrooms. Associated with this research staff will be a team of observers trained to collect data regularly on pupils, teachers, administrators, and parents. Also associated with this staff will be a "teacher-instructor," responsible for training the teachers to use the specific methods and for working closely with them. The person filling this position will be an experienced teacher who will work with the regular classroom teachers and with the research staff, serving as a link between them.

We propose to use many different data-gathering devices, including videotape recordings, interviews, and tests. We are deliberately not limiting ourselves to one technique or a carefully planned experimental design. We shall rather use these field sites to stimulate our thinking and so will let our observations guide our specific investigations. These field situations are necessary to test our ideas as well as to stimulate our thinking about practical problems. At a later date, carefully designed experiments will certainly be conducted, but we would lose major benefits of live observations by doing so now.

We can be more specific about the following experimental studies, a series of programs and projects to be undertaken during the next two years. The first of these programs is described in some detail, while the remainder are merely sketched.

Experiments on Uncertainty Training (J. E. Sieber)

In this program, experiments will be performed to discover what forms of heuristic teaching instill an ability to generate and handle uncertainty. The uncertainty referred to here is not that of neurotic indecision or continual confusion. It refers to the behavior of an individual who informs himself as to alternative means or points of view, and who acquires information in order to evaluate these alternatives. It implies a willingness to delay decision when it is practical to do so, but it also implies an ability to make decisions in the face of uncertainty, when required, and a willingness to re-evaluate decisions given additional information. The occasional confusion and indirection implied by the word uncertainty may seem antithetical to the development of the sense of style, that is, direct attainment of a foreseen and, simply and without waste. But uncertainty and reflection (the production and evaluation of alternative means to a goal) are the antecedents, not the antitheses, of insight, understanding, and hence style. Without this antecedent activity, the learning of routines for efficient attainment of ends involves no insight and cannot be generalized.

There are theoretical grounds for believing that uncertainty and "uncertainty behaviors" underlie inquiry-oriented thinking and other complex cognitive processes. Uncertainty behavior, as we will call it, occurs when a person recognizes that he is=in an ambiguous situation or when he realizes that new goals and solutions may exist. The research we outline is designed to disclose ways of training children to evaluate ambiguous problem-solving situations and of training teachers to stimulate children to learn these uncertanty behaviors."

Uncertainty as an objective. Persons often apply old solutions to new problems because old and new problems resemble one another, but they overlook their many dissimilarities. This kind of thinking permits persons to act quickly and with a (false) sense of confidence. It frequently leads, however, to wrong solutions and failure to develop new insights, goals, and strategies. Teachers foster this kind of thinking by rewarding quick answers. In environments (such as slums) in which persons usually communicate in imperative statements, children do not learn how to express relationships which are hypothetical, probabilistic, or contingent on other events. Hess and Shipman (1965*) suggest that slum children's simplistic language causes them to think and act in stereo typed uncertain ways. The aim of the proposed research is to discover ways of overcoming such simple, stereotyped patterns of thinking.

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*R. D. Hess & Virginia Shipman. Early experience and the socialization of cognitive modes in children. _Child Development_, 1965, 36, 869-886.

The aim of these experiments is congruent with some of the goals of education. For example, Whitehead* stated that students should learn to search for understanding of present events in relation to the past and future. Dewey** emphasized the importance of developing students' sense of judgement, or their ability to select proper ends and the means appropriate to their attainment. He went on to suggest that it is important to know when to be uncertain.

> The commonest fallacy is to suppose that since the state of doubt is accompanied by a feeling of uncertainty, knowledge arises when this feeling gives way to assurance...Tendency to premature judgement, jumping to conclusions, excessive level of simplicity, making over evidence to suit desire, taking the familiar for the clear, etc., all spring from confusing the feeling of certitude with a certified or certifiable situation. (p. 127)

And, as Bruner*** put it,

> Consider...the problem of self-conscious reflectiveness. It is an epistemological mystery why traditional education has so

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* A. N. Whitehead. The aims of education and other essays. New York: The MacMillan Co., 1929.

** J. Dewey. The quest for certainty. New York: Minton, Balch & Co. 1929.

*** J. S. Bruner. The growth of mind. American Psychologist, 1965, 20, 1007-1017.

> often emphasized extensiveness and coverage over intensiveness and depth...memorizing then [is] usually perceived by children as one of the high-priority tasks, but rarely [do] children sense an emphasis on ratiocination with a view toward redefining what has been encountered, reshaping it, reconsidering it. The cultivation of reflectiveness, or whatever you choose to call it, is one of the great problems one faces in devising curriculum. How lead children to discover the powers and pleasures that await the exercise of retrospection?

Previous research on uncertainty training. To adequately understand how uncertainty behaviors or reflective thinking may be taught to students, we must first be able to characterize some of the different ways in which persons perceive problems, select information, and make judgements. Then, ways of supplanting the undesired modes of thinking with desired modes must be discovered and developed into usable methods. An adequate theory is required to provide a framework for this research and development program.

Of the various psychological theories of human judgement processes, Berlyne's* theory of epistemic curiosity, which deals with the relationship of conflict, curiosity, and uncertainty to intellectual growth and decision-making seemed the most appropriate for our purposes. By integrating Berlyne's theory with theories of cognitive structure, Sieber** developed a model of individual differences in decision-making. From this model it is easy to formulate testable hypotheses concerning ways to supplant undesired decision processes with more desirable ones. A number of such hypotheses have already been formulated and empirically verified. For example, it was found that persons taught to attend to problem-related cues, also persons taught to give many different solution hypotheses for each problem, then began to acquire more information before making judgements, discriminate between indeterminate and determinate problems, and to increase in ability to give correct answers (e.g. Sieber, 1968).* Likewise, lower-class children taught to estimate the likelihood of being correct learned to discriminate indeterminate from determinate problems (e.g.Sieber, in press).**

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* D. E. Berlyne. *Conflict, arousal and curiosity*. New York: McGraw-Hill, 1960.

** J. E. Sieber. Individual differences in decision making. Research Memorandum #23, Stanford University, Stanford Center for Research and Development and Teaching.

This preliminary research and theorizing has identified a number of cognitive skills which underlie learning to avoid premature judgement and to make correct use of available, although often disorganized information. These skills include ability to attend to cues, ability to generate alternative solutions, understanding of the use of sentential connectives which enable one to organize and talk about complex and problematic relationships (e.g., if___, then___; if___, or___, then probably___), ability to see that the variety of means to a given goal may depend on the ingenuity of the individual, ability to delay responding, and willingness to admit uncertainty. The following research program has been designed to further investigate ways of teaching these behaviors.

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* op. cit.

** J. Sieber. Overcoming secondary ignorance: training when to be uncertain. The Elementary School Journal, in press.

Proposed research on uncertainty training. The first study will be exploratory and will involve one classroom. It will determine the degree to which uncertainty behaviors characterize lower-middle class fifth-grade children and the extent to which these behaviors can be taught to such children. It will also determine the correlation of these behaviors with age, sex, ethnic group, IQ, grades, and test anxiety. The uncertainty behaviors to be studied are (a) ability to discriminate certain from probabilistic situations, including ability to estimate probability, (b) ability to generate alternatives, (c) ability to discriminate cues, (d) ability to produce hypotheses based on cues discriminated, (e) ability to estimate when one does not know an answer for certain, (f) ability to describe relationships requiring the use of conditional, disjunctive, probabilistic, or complex relationships, and (g) willingness to volunteer qualified statements in class discussions.

Experimental procedures (Sieber, 1968, pp. 32-34*) aimed at improving the uncertainty behaviors will be administered individually and in group sessions in the context of science or social studies lessons. This training will take the form of eliciting and reinforcing descriptions of problem-relevant cues, the production of solution hypotheses, probability estimation, volunteering qualified statements, etc.

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[*] Sieber, op. cit.

In a second study, we will perform a two-year experiment, involving the variables examined in the above study and some additional variables. This experiment will be conducted in Grades 1, 4, 8, and 12 in middle- and lower-class schools. There will be three experimental conditions and a control condition. Measures of uncertainty behaviors will be obtained in all groups at the beginning and end of the period of the study. In the first,or individual training, condition, we will give training, exercises, and tests in the uncertainty skills listed above, but the teacher will not specifically try to produce uncertainty behaviors in classroom discussions. Baseline measures of each dependent variable will be obtained. Their relation to age, social class, sex, intelligence, grade-point average, test anxiety, and defensiveness will be determined. (These data will also be gathered for the second and third conditions, and the control group; hence the combined data will be based on enough cases for correlational purposes.)

The uncertainty training techniques described for the first study will be administered to each student. The training data will be analyzed to determine the degree to which the subjects' rate of learning, or number of trials can be needed to reach the learning criterion is related to their age, social class, personality variables, and the particular uncertainty behavior being taught.

After subjects have received the initial uncertainty training, they will be given exercises and weekly tests requiring them to use the uncertainty behaviors they have learned. Their performance in these tests over the year will be examined.

Although the teacher will not teach specifically for transfer of these uncertainty behaviors to classroom discussions, she will not inhibit such behaviors. The generalization of uncertainty behaviors to classroom discussion will be examined by recording and coding student-led, small-group discussions. These discussions will be compared across grades and social classes, and each will be compared with its own base-line measure of uncertainty in discussions at the beginning of the year, to determine whether the effects of the individual training, written exercises, and tests generalize to group discussions. Evidence of transfer to classroom behavior will be sought.

In the second, or group training, condition, we will examine the effects of teachers' use of uncertainty training techniques in class discussions without using individual uncertainty training of students or uncertainty testing procedures such as those used in the first condition. In the fall, teachers will begin to develop their uncertainty teaching skills in consultation with Stanford personnel and will learn to write lesson plans which contain at least one instance of each uncertainty skill. The use of these skills will be especially emphasized in science and social studies lessons; any spontaneous generalization by the teacher to other areas will be welcomed but not seriously worked at. Teachers will be trained in the theory and skills involved in eliciting subjective uncertainty in classroom discussions, and will participate in workshops if arrangements can be made for the teachers to have time off for this purpose. Stanford assistants may conduct some of the teacher's classes, utilizing this time to administer tests and obtain other measures. Having gradually developed these skills in the fall, the teachers will be regularly using them in their science and social studies lessons by winter. Their behavior will be monitored from time to time to determine that each science and social studies lesson utilizes each uncertainty-eliciting technique at least once.

By recording and coding classroom conversations, the staff of the project will determine which uncertainty-eliciting techniques of teachers are most successful with students in classroom discussions. There will be student-led small-group discussions, whose content will be analyzed for uncertainty behaviors.

In the third, or individual and group discussion training condition, to be applied in 1969-1970, the combined training procedures of the first two conditions will be given to a new group of pupils in grades 1, 4, 8, and 12, in middle and lower class schools. The teachers involved will be those who participated in the two previous conditions. (Since two separate groups of teachers were involved in the first two conditions, losses due to teachers dropping out of the experiment the second year will probably not interfere with the research design, as there will undoubtedly be enough teachers remaining at each school to complete the design required for this third condition.) Teachers will be instructed in those techniques which they did not learn the previous year. For example, the teachers who participated in the first condition will be taught how to elicit uncertainty in class discussions, and teachers who participated in the second condition will be given training in devising tests and exercises which elicit uncertainty behaviors. The dependent variables already described for the previous conditions will be measured at various times during the 1969-1970 school year.

A control group will contain groups of students as similar as possible in relevent ways to the groups that receive training. These students will receive no special training, but their uncertainty behaviors will be measured at the beginning and end of the year. Comparisons will be made between the four conditions to determine which are the most efficient ways of producing the various uncertainty behaviors.

Beyond these experiments, we hope to develop and test uncertainty teaching techniques especially suitable to various age and grade levels, socioeconomic levels, disciplines (science, social studies, etc.). In addition, new approaches to teaching uncertainty (such as role-playing, modeling, etc.) may be developed. Future experiments will be based upon these developments. New teachers will be trained in the use of these techniques in the summer and in the fall of subsequent years. Students and teachers will be measured and compared on dependent variables with teachers previously trained to use the less specific techniques. In short, the results of these new experiments will be compared with the results of old experiments.

A third study will deal with the acquisition and use of uncertainty skills by teaching interns. An intern training experiment will be initiated in the summer of 1969; it will involve 60 intern teachers in a 2 x 2 experimental design. All interns will be instructed in the theory of uncertainty training and will be shown some films on the use of techniques. In Condition A, a random half of the interns will be required to develop lesson plans based on the theory of uncertainty training and including the use of all of a set of uncertainty training skills. In

Condition B, interns will have an opportunity to choose only those skills which suit their preference, to develop a comprehensive rationale for using them, and to develop lesson plans based upon them.

Interns in Condition A will be divided at random into Groups 1 and 2, each containing 15 interns. Interns in Group 1 will be given a student version of uncertainty training prior to instruction in teaching uncertainty skills. Interns in Group 2 will not receive the student version of uncertainty training. The purpose of this arrangement is to determine whether teachers can adequately teach uncertainty skills in which they have not received training. The same two groups, A and B, will be formed at random for the interns in Condition B. Personality data, including measures of IQ, anxiety, dogmatism, ideational fluency, and grade-point average, will be collected on these teachers. The following dependent variables will be measured: (1) the use by teachers of the uncertainty skills in microteaching and in their classrooms (2) their students' scores on some of the dependent variables described in the studies outlined above, (3) the extent to which each skill is used in the subsequent year of teaching, and (4) teachers' selection and use of available uncertainty tests.

Experiments on Heuristic Behaviors in Disadvantaged Children (R. D. Hess, Joan Sieber, and F. J. McDonald).

Three experimental studies are proposed for next year on the effects of certain variables on heuristic behaviors in disadvantaged children. In the first study, the dependent variable is task persistence. Obviously, persisting at a task is necessary to achieve successfully the goals of the task. First, a frequently-made assumption will be tested, namely, that middle-class children are rewarded for and readily learn task persistence, while minority youth are impulsive in a way that interferes with it. That is, if a member of a disadvantaged group wishes to achieve a goal which requires persistence, is it true that he more often does not have this set of behaviors in his repertoire? If the difference is found, it will be important to seek to improve persistence. The proposed study will assess the effects of self-reinforcement on task persistence, the relation of expectancy of success to self-reinforcement, and the effects of task persistence itself on achievement.

In the second study of disadvantaged youth, the purpose is to test the effects of modeling treatments on a child's learning to admit the existence of ambiguity in a problem-solving situation. Many disadvantaged children have difficulty in accurately assessing the limits of their knowledge in a problem-solving situation (Sieber, in press[*]). It is hypothesized that some children cannot admit uncertainty in school-related situations because admission of doubt has not been rewarded. Hess and Shipman (1965[**]) report that lower-class children's mothers use more imperative statements and are less likely to accept their children's incomplete solutions to a problem than middle-class mothers are. In this study, children will observe models of other children expressing doubt in ambiguous problem-solving situations. The effects of being exposed to these models, presented on videotape, will be tested.

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[*] J. Sieber. Overcoming secondary ignorance: Learning to be uncertain. The Elementary School Journal, in press.

[**] R. D. Hess & V. C. Shipman, op. cit.

In the third study of this series, the purpose is to analyze the effects of teaching children to utilize cue-discrimination techniques to improve their information-processing abilities. Kagan (1965*) has found stable individual differences in impulsivity levels in middle-class children. It is hypothesized that many minority-group children respond impulsively partly because of their relatively poor information-processing capacities. They live in an environment which tends to reward them for over-simplification of discriminative perceptual and cognitive processes. In this experiment, variables will be manipulated to see if children can learn to control their impulsivity by teaching careful cue discrimination, or by simply increasing the amount of contingent reinforcement they achieve.

The dependent variables in these studies are inter-related aspects of the same general phenomenon: task persistence, control of impulsivity, and tolerance of ambiguity. These studies should yield improved understanding of the kinds of training procedures necessary to produce these behaviors in students.

Aptitude-Treatment Interaction in Heuristic Teaching (R. E. Snow).

A major concern of this problem area is the identification of those teacher aptitudes which either facilitate heuristic teaching or interfere with it. One of the affiliated projects of the Center has been the Aptitude-Treatment Interaction Study directed by Professors Cronbach and Snow. The studies outlined here would apply what has been learned in that study to the problem of the relation between aptitudes of teachers, the aptitudes of students, and heuristic teaching styles.

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* J. Kagan. Impulsive and reflective children: Significance of the conceptual tempo. In J. D. Krumboltz (Ed.), Learning and the educational process. Chicago: Rand McNally, 1965.

Below are outlined two studies forming stages in a larger program of research. The general purpose of the work is to investigate teacher characteristics and styles of teaching as treatment variables that interact with student characteristics and styles of learning. Thus, the emphasis is on aptitudes for teaching in interaction with aptitudes for learning, assuming that the proper research question is "What particular styles and methods of teaching are effective for particular outcomes and styles of learning?" not "What is effective teaching in general?"*

Aptitude-Treatment Interaction in Teacher-Pupil Dialogues. A first need is to examine extemporaneous and heuristic aspects of teaching in a closely controlled dialogue situation, so that important stylistic variables can be defined and related to underlying personality characteristics of teachers. Twenty teachers would be randomly assigned to 20 students, forming 20 one-to-one dialogue or dyadic units. Each teacher-student pair would then meet together for about five 50-minute sessions (one a day for five days). Instructional materials (perhaps programmed or text materials) could be specified for learning by the students.

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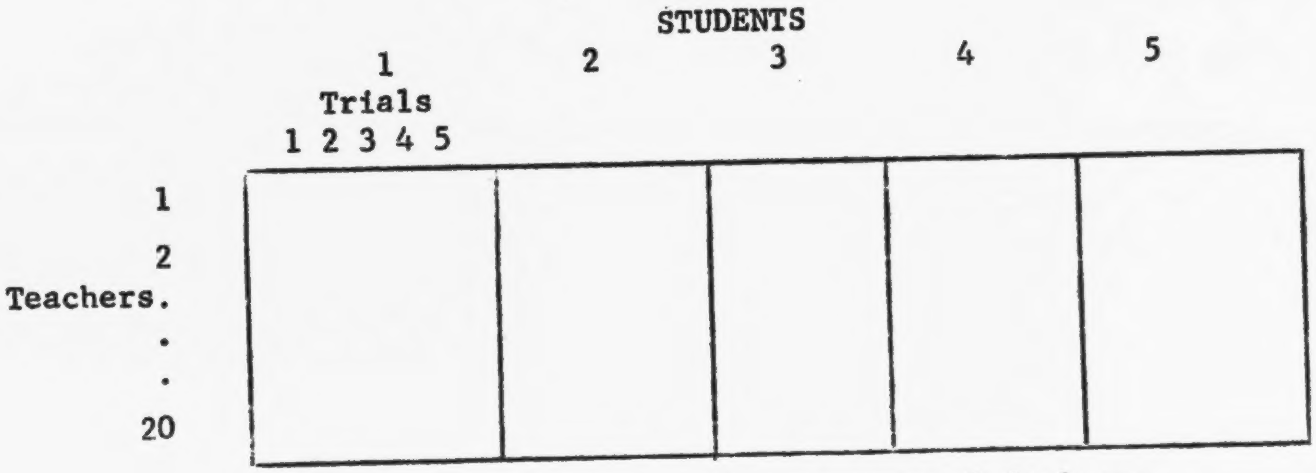
* Cf. L. J. Cronbach. How can instruction be adapted to individual differences? In R. M. Gagné (Ed.), _Learning and individual differences_. Columbus, Ohio: Charles E. Merrill, 1967. Pp. 23-29.
L. Siegel & Lila C. Siegel. A multivariate paradigm for educational research. _Psychological Bulletin_, 1967, 68, 306-326.

The teacher might lecture or assign reading for part of the time, but the emphasis would be on student-initiated dialogue, with the printed materials forming a common base. The student would use the teacher as a resource for explanation and elaboration beyond the text, with the teacher attempting to guide student inquiry toward higher levels of cognitive functioning.

The task for each dialogue session would be to obtain as high a level of judged cognitive behavior in student participation and achievement test performance as possible. After five trials, a new student would be randomly assigned to each teacher, with the same type of instruction repeated. Approximately five students, each with five trials, would be used with each teacher to form the data matrix shown below.



(One observation per cell, measures of dialogue characteristics and/or achievement test performance)

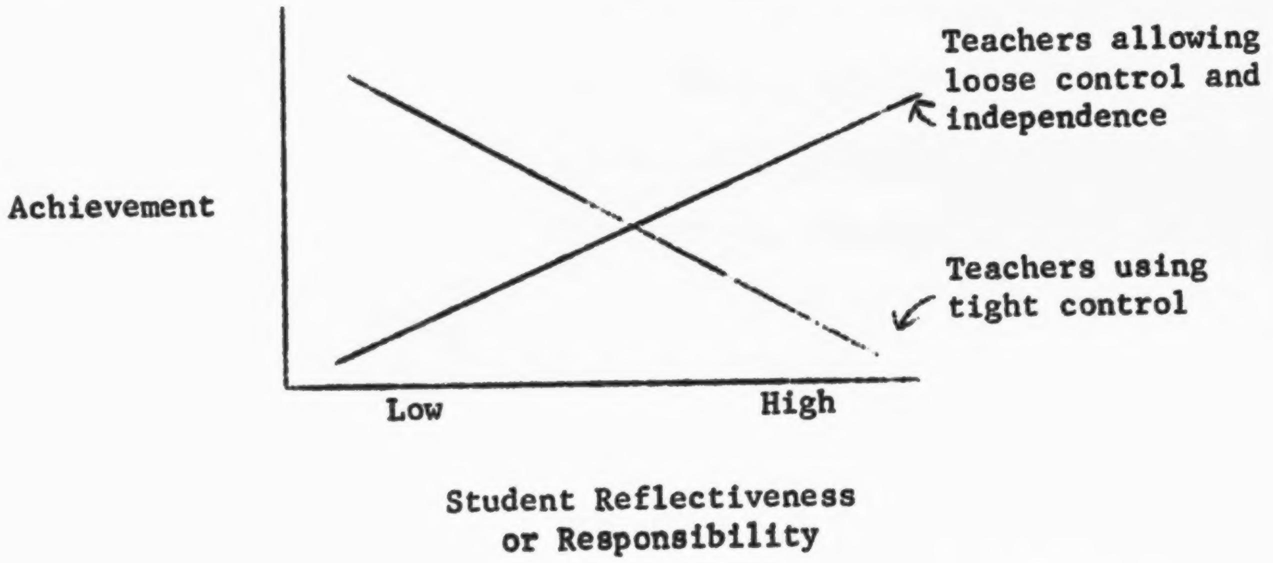
The teachers may be chosen to vary along measured personality variables, such as cognitive complexity-simplicity, divergent vs. convergent thinking ability, authoritarianism, or need for affiliation vs. need for power. Similarly, the students may be systematically chosen to represent aptitude variations. In pilot work, however, randomly chosen and assigned subjects would probably be used. (Over a series of such studies, however, important aptitude definitions will emerge, suggesting variables to be systematically included.)

The use of a series of students plus trials within students is directly analogous to Harlow's learning-set design. This design makes possible studying both improvement over trials within a teacher-pupil dialogue and more general improvement over dialogues, thus arriving at ideas about the formation of teaching sets as well as learning sets. With the protocols derived from such situations, it is also possible to move toward a computer simulation of the student side of the dialogue, thereby developing an important computer-assisted teacher-training device.

Aptitude-Treatment Interactions in Classrooms. This study would investigate interactions, coordinate with those described above, in real classrooms. Many earlier studies have sought to relate rated or measured teacher characteristics and styles to average class achievement. Few, if any, have sought to relate these teacher variables to the correlations between student aptitudes and achievement.

Suppose that for power-oriented teachers the correlation between student mental ability and achievement is high, but for highly affiliative teachers, the correlation is low. Or, suppose that, for teachers who loosely control their classes and allow much independent work, the correlation between student reflectivity or responsibility and achievement is high, but for teachers who exact close control over feedback and reinforcement, the same correlations are low, zero, or negative.

Or, suppose that heuristic teaching produces high correlations between measures of divergent thinking abilities and achievement in students, while didactic teaching produces high correlations between convergent thinking abilities and achievements. These hypotheses cannot be examined using class averages. They require aptitude-treatment interaction research, aimed at findings like the hypothetical result depicted below.



This study would seek out such interactions in existing classrooms and attempt to develop observation techniques appropriate for measuring teacher styles specifically hypothesized as interactional. Strong emphasis would be placed on the longitudinal development of these interactions. It is likely that such phenomena evolve over many class sessions, requiring more concern for ideographic research than has been evidenced in the past.

These two studies would provide a basis for developing a program of research on the interaction effects of teacher aptitude variables and teacher training methods. As suggested previously, not all teachers are likely to be capable of learning to teach heuristically. The studies described above would provide relevant data on teachers, which will be followed up with training-aptitude studies.

Heuristic Teaching and the Sense of Personal Competence (C. Thoresen).

The studies in this project area and the next are training studies. Each of these project areas deals with a different aspect of teacher behavior, but both are based on the same theoretical background and use similar research methods. The present section described studies of how teachers acquire confidence in teaching with the heuristic style; the next project area deals with direct training of the specific teaching behaviors considered to be components of the heuristic style.

The major purpose of this project is to study the relationship between a preservice teacher's feelings about his personal competence and his acquisition of heuristic teaching competence. That beginning teachers are concerned about their skill in teaching is not surprising. Our observations suggest that these feelings of concern appear to be part of their concerns for their development as persons. Entering teaching is part of a significant developmental task. Many preservice teachers have postponed their decision about career goals until shortly before graduation from college. Others have had several career goals in view and are experimenting with teaching to see if it will satisfy their needs. Still others have commitments to significant values which they expect to achieve through teaching; their struggle with the realities of learning to teach, and the experience of teaching in schools, frequently makes it difficult for them to achieve these significant values.

Teaching forces on an individual an awareness of aspects of his personality of which he may have been unaware. Beginning teachers, who have been students for so long, must now assume a role in which they take considerable responsibility for the activities of other persons. Such responsibilities require changes in self-perception and frequently arouse anxiety.

The present studies deal with the influence of feelings of personal inadequacy, conceptions of one's self, and actual experience in classrooms on the way in which intern teachers think about themselves in the teaching process. The long-term aim of this project is to assess the degree to which characteristics of this kind affect training.

The Assessment of Personal Competencies of Teaching Interns. The objective of this study to be conducted in the summer and fall of 1968, will be to identify the concrete, specific personal concerns of beginning teaching interns. A series of studies completed at the University of Texas over the last several years has been reviewed by Thoresen. These studies provide evidence that beginning teachers are primarily concerned with questions of personal adequacy and competence. Until such concerns are constructively handled, attention to the individual student in the classroom setting tends to be restricted. Data on these concerns will permit specific problem identification and will be used in tailoring experimental treatments to these problems.

Data gathered in a small-scale preliminary study in December 1967 suggest that interns enter training with a variety of problems involving person competencies and skills--problems not considered at any point during professional training but often interfering with the acquisition of teaching skills and with classroom performance in general.

The study will develop a variety of techniques for gathering comprehensive data relevant to specific procedures in dealing with individual problems. During this initial study, these techniques for assessing problem behaviors will include self-report, observational, and physiological methods.

Structured individual interviews, structured small-group discussion sessions, behavioral sampling experiences, self-report problem check lists, and observation techniques (direct and unobtrusive) will be used.

Considerable work will be done to develop behavioral sampling experiences to simulate real life stress situations that are proving difficult for trainees. Such simulations might involve acting out the student in a classroom situation, an intolerant and authoritarian school administrator, an emotionally disturbed student, parent or colleague, and culturally different and aggressive parents.

Each of these problems is typical of general problems likely to arise in teaching. But the content of the problems in this case will be related to using heuristic teaching styles. For example, the authoritarian administrator will be incensed at the freedom given students; the culturally different parent will question the value of learning in this mode to his child in becoming an equal to the white, middle-class child. Considerable work will also be necessary in developing comprehensive structured interview protocols and guidelines for conducting small-group assessment discussions.

In the summer of 1968, efforts will be started to develop instrumentation and to utilize teaching interns in the development process. It is anticipated that their development phase will span the summer and autumn of 1968. Concurrently, data will be gathered on the most commonly cited specific problems of personal concern. It is anticipated, on the basis of pilot data, that excessive anxiety reactions will constitute a major concern. To this end, work will be initiated on refining techniques for assessing anxiety reactions to given stimulus situations.

The principal anticipated product is the beginning of a comprehensive system of assessing problems of personal competence. Such an assessment system could be used by teacher training institutions and large school districts for selection, placement and differential training programs. The project will also generate data on the frequency and magnitude of specific problems of teachers which will be used to develop specific treatment procedures to modify the behaviors in question.

A Study of Methods of Reducing Anxiety in Teachers. A second study will be concerned with training teachers to control their anxiety in class. As has been mentioned at several points in this report, heuristic teaching will probably be anxiety-provoking for teachers. If they cannot cope with this anxiety, they will abandon the style.

Heuristic teaching styles may also make resistance and anxiety in students, who in turn may create stress and anxiety situations for the teacher.

This study will explore differential treatment techniques for helping teachers eliminate excessive anxiety reactions to stress situations related to heuristic teaching.

It will determine which types of teachers are more responsive to which type of sequence of treatment techniques in reducing excessive anxiety. Efforts will be made to explore the efficacy and feasibility of using small group settings for the treating of anxiety problems. The way in which reduction of anxiety reactions to stress situations is reflected in verbal and nonverbal teaching behaviors in the classroom will be considered.

It may also be possible to explore the effects of reducing excessive anxiety reactions by training teachers to control physiological responses.

Approximately 64 teaching interns will be selected in the summer and fall of 1968 on the basis of previous assessment data indicating excessive anxiety in particular areas. A series of treatment procedures will be developed during the fall of 1968 to determine which treatment is most influential in reducing anxiety reactions. Treatments are tentatively planned as follows:

	No. of _S_s
1. Group Systematic Desensitization, 3 groups of 4 _S_s	12
2. Group Social Model Participation, 3 groups of 4 _S_s	12
3. Self-directed Group Counseling, 3 groups of 4 _S_s	12
4. Attention Placebo, 3 groups of 4 _S_s	12
5. Wait Control	8
6. No-contact Control	8

Outcome criteria will include observed reactions to simulated stress situations tailored to the problem of a specific individual, observations of classroom behaviors, self-report measures of anxiety, GSR, and EKG.

It is anticipated that a pilot study of some or all of the above procedures will be conducted with full-time classroom teachers in the school setting. Data gathered during the summer will provide information on the kinds of assessment techniques that will be most suitable for use with teachers employed full-time.

One possibility to be explored will involve the training of school counselors regularly by the respective schools, to administer the various treatments to teachers in their own schools. Another possibility is to train counseling interns in the master's degree program to administer treatments in the school setting.

This experiment may provide data on how teachers in training, as well as teachers on the job, can be assisted in reducing debilitating anxiety responses. Such procedures, of course, can be used in teacher-training institutions to help specific trainees deal with personal concerns. In addition, depending on the outcome of the pilot study with in-service teachers, information will be available on the feasibility of working with teachers in the regular school setting.

Training Research (F. J. McDonald)

This project continues the work conducted at the Center over the past. two years on the technical skills of teaching. The general purpose of this work is to develop training methods, utilizing modeling and feedback procedures, which facilitate acquisition of basic teaching skills known to have specific effects on pupils. During the past several years, work has progressed on defining and describing technical skills which the teacher may use to encourage discourse between students and himself, and to raise the cognitive level of this discourse. For example, one such basic skill, termed "reinforcing students' participation in classroom discussion," is useful for many different purposes. Specifically, it is useful when the teacher wishes to reward a student for asking a thought-provoking question, giving his opinions, or evaluating his ideas. Another example is that termed "asking higher-order questions." These questioning techniques may be used by the teacher to elicit behaviors such as analyzing, synthesizing, evaluating, hypothesizing, and predicting.

The process of describing and defining these technical skills has been one aspect of the experiments on training for their acquisition. Thus, each skill developed has been tested as a dependent variable in an experiment designed to promote learning of the skill.

The research in this project area has had, therefore, a dual purpose: first, to identify training variables that are effective in producing the learning of teaching behaviors; second, to study these teaching behavior themselves and, in doing so, to describe them in operational terms.

These major purposes of the project remain unchanged. With the new focus on heuristic teaching, however, the technical skills studied will be specifically oriented to those skills which are or seem to be directly related to eliciting a pupil behavior of a complex, inquiry-oriented character. Similarly, continued emphasis, at least initially, will be placed on manipulating variables associated with modeling and feedback techniques. Sufficient evidence has been accumulated about the effects of these variables to provide the basis for radical innovations in training procedures.

Training in combinations of skills. Since most of the work on technical skills has been conducted in the form of experiments embedded in the on-going teacher-training program, we have not tested different arrangements of learning sequences or developed packages of programs.

Although we have used a task-analysis approach to training, it has been apparent that many of our trainees could probably learn the component skills in pairs or in groups. The skills themselves are interdependent; for example, a sequence of asking a question, reinforcing students for answering, and listening to an answer, may be a natural unit of behavior. It was necessary to make logical analyses of the components of these teaching skills as a first step. Now that such components have been identified, an appropriate second step is to attempt to teach the skills in groups of two or three. The skills may be more easily learned in combination than singly. Learning them in this way may increase transfer to more complex teaching situations. That is, the appropriate behavioral unit may be the combination rather than the logically identified components. Data from work performed in the summer of 1967 will enable us to answer some questions about the sequencing of training on particular skills.

The study described here represents another attack on the same problem. One group will be exposed to instructions in which the skills are presented in combinations. A film describing the concept of the technical skills of teaching and showing three models using the skills will be used to instruct one experimental group. The second group will be taught the skills singly without showing them as part of an integrated performance. The prediction is that the presentation of the concept and illustrations of its sub-parts as a totality will be a more effective training strategy.

This study will be one in a sequence leading to the development of systems of training on the technical skills. It is expected that, by the summer of 1969, two or three different training systems, each with its own rationale based on research, will be available for thorough testing.

Pupils' question-asking as a function of the teacher's modeling and reinforcement. As already stated, the research on the technical skills has aimed to develop techniques of questioning which raise the level of pupils' cognitive activity in class. Presumably, teaching students how to formulate good questionsleads to more original and productive thinking on their part.

The purpose of this experiment is to increase the number and quality of questions asked by students. Many studies at Stanford and elsewhere (e.g., Bellack, et al., 1966*) indicate that very little question-asking by pupils occurs spontaneously. Most questioning is done by the teacher; the pupil merely responds. Some data from an experiment conducted this year, however, suggest that as the teacher raises the level of her questioning, such questions as are asked by the pupils are of a higher quality.

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* A. Bellack, et al., The language of the classroom. New York: Teachers College Press, 1966. Pp. 41-86.

Two factors may influence the questioning behavior of pupils in a classroom. First, the student often does not know how to formulate a good question. The teacher's questions may thus serve as a model for the student's. Second, whether or not a student will ask such questions or will continue to ask them if he has attempted to, is influenced by the amount of reinforcement the teacher provides for asking them (McDonald and Allen, 1967*).

In this study, these two factors will be varied. In one condition, teachers will reinforce but not model; in another, they will model but not reinforce; in a third condition, they will both model and reinforce. The fourth condition, a control, will be a traditional lesson where reinforcement consists merely of indicating whether the pupil has made a right or wrong response to the teacher's questions, and where the questioning will be of the low order characteristic of many classrooms.

Pupils' question-asking over a series of lessons. This study will be a variation on the one just described. Its exact design will be determined after the results of that study have been analyzed. The purpose of the study is to determine what sequence of modeling and feedback is most effective across a series of lessons in influencing students to consistently ask questions of high order.

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* F. J. McDonald & D. Allen, Training effects of feedback and modeling procedures on teaching performance. Final Report on USOE Project OE-6-10-078. Stanford, Calif.: School of Education, Stanford Univ., 1967.

The previous study will provide data on the relative influence of these two variables, but the lesson length will be short. Furthermore, variables effective in one instance may change in effectiveness over a sequence of repeated lessons. Yet the goal of the teaching is to bring pupils to the point where they habitually raise questions of high quality.

This study will involve a relatively small number of teachers in their regular classrooms. A set of lessons will be prepared to be used over a two- or three-week period. These classes using these lessons will be studied intensively and evaluated periodically at subsequent occasions to assess the long-term effectiveness of the training. Although details of the design will be dependent upon the results of the preceding study, a representative study will compare the following conditions. One condition will probably use operant conditioning in which the teacher consistently reinforces good questions. The teaching strategy will be to find ways of eliciting these questions by presenting problematic situations likely to elicit more than factual questions. Such situations will then give the teacher an opportunity to reinforce good questions when they appear. A second condition will use videotapes of pupils demonstrating the required behavior. In a third and contrasting condition, teachers will show whether watching other pupils perform the behavior, watching the teacher perform it, or being reinforced for performing the behavior has greater effectiveness in elevating the quality of pupil questioning.

These sessions, in a regular classroom and over a relatively long period, will provide information on the difficulties of complex questioning procedures. Sessions will probably be conducted in classrooms of intern teachers who have participated in the studies of personal security, described above. Thus, the two kinds of data on these teachers--effects of the summer training on the development of their sense of security, and behavioral data on their performance of questioning strategies--can be studied together.

Small Group Research (R. Koff and F. Hawkinshire)

Exploratory studies to be conducted during the first year of this project will deal with the training of interns. They will be based on preliminary work during the past year.

In a first study, the effects of a type of sensitivity training will be further explored with intern teachers. This training is intended to make the trainees aware of the dynamic, interpersonal, affective processes generated in group activity. These sensitizing procedures are being tried to assess their feasibility, to see how teachers respond to the training, and to identify problems associated with it. The research question is the extent to which such sensitization improves the conduct of effective group activity in classrooms.

Heuristic teaching styles will probably rely heavily on group activity, small group interactions, and person-to-person dialogue. This study will test how the sensitation process affects the use of heuristic teaching styles.

A second study will assess how an inquiry-oriented, as contrasted to a sensitivity-oriented, group process can be used to help interns learn heuristic teaching style. This process will engage them as students. The research question is, again, the extent to which this kind of involvement as students increases effectiveness in heuristic teaching.

Both studies will be concerned with developing procedures and instruments for assessing their effects. By the next project year, the work on this project and the preceding ones may be integrated into a systematic attack on the problem of training teachers to use heuristic styles.

Modeling Inquiry Behavior for Students (C. Thoresen)

The purpose of these studies is to test the feasibility of some training procedures which now appear to be essential if innovations in teaching styles are to be made. New teaching styles which demand much independent activity from the student produce significant changes in the whole system of schooling. Unless these changes are studied and controlled, it is unlikely that significant innovations will be made. Failure to study these system problems has, in the past, defeated similar innovations.

One of the most difficult problems is to specify for students the kind of behavior expected of them when the teacher uses heuristic teaching methods. One approach to this problem is to show students how a student behaves when a teacher uses such methods. Some experience with this type of modeling, using videotapes, has been accumulated in the counseling program at Stanford. Students were shown tapes of other students portraying information-seeking behavior. These tapes produced significant changes in the behavior of their audiences.

We propose a similar approach to teaching students inquiry methods, conducted concurrently with training aimed at modifying the teacher's behavior. These efforts will be exploratory first steps in testing the feasibility and potential effectiveness of both kinds of training.

Inquiry Games (F. J. McDonald)

Another problem is that the adults in the system are likely to be threatened by this innovation or to underestimate its educational utility. We propose to develop a set of inquiry games for adults and students to play together. The function of these games will be to teach both adults and children something about the inquiry process. Their most important effect would be to show the adults that children can acquire these behaviors, that the behaviors are educationally worthwhile and need not threaten relations between children and adults. These games should have a certain promotional value in stimulating the adults' interest in the inquiry process and the new teaching style. The adults we would expect to involve in these games would be both school personnel and the parents of children being taught by the new procedures.

A project of this general character was conducted by the San Jose School District in schools with large numbers of minority youth. Parents, teachers, and administrators spent one week in intense educational activities away from the actual school site. This project, developed by the Lockheed Aircraft Corporation, built much of the activity around a game demanding inquiry skills. Reports on this project indicated that it was highly successful and had a significant effect on the attitudes of both school personnel and parents. The children's reaction, intensely positive, was that it was the most significant educational activity of the year.

Involving Counselors in Changes of Teaching Method (C. Thoresen)

When a teacher begins using a new teaching style, he may experience considerable insecurity. The children have difficulty in coping with the new teaching procedures, since they have been trained to react in a passive way not requiring initiative. It has long been recommended that counselors in schools work with teachers on classroom problems. But this recommendation, usually made for behavior problems or emotional conflicts between teacher and students, has had essentially a negative orientation.

We propose to involve the counselors with the students and teachers in a positive way, helping them to analyze what is occurring between teachers and students as the teaching methods are introduced.

This pilot study envisions a radical change in the role of the counselor with respect to teachers and students. We will attempt to involve counselors from the beginning in working with the classes where the heuristic teaching styles will be tried out. There is almost no literature on the problems in this kind of interaction and even less experience with counselor-teacher-student relations of this kind. The exploratory character of this study is obvious.

Products

A film entitled The Technical Skills of Teaching, produced in the past year, has been very favorably received and will probably have a large distribution. A package of accessory materials will be developed for use with this film. The film will explain the concept and show models. Videotaped copies of the model will be available, together with instructions on how to use the models. A manual for rating teaching performance on the technical skills will also be developed.

(Work has begun on this project.)

A set of pupil-training films will result from the experimental work in the project described above. These films will be developed into training programs for teachers to use in training students in inquiry behavior.

We are also developing a manual describing how to utilize microteaching, the technical skills of teaching, psychological concepts and principles, and audiovisual equipment, such as the videotape recorder, to develop programs which apply the ideas with which we have been experimenting.

Intern Data Bank

The basic data in the Intern Data Bank have been gathered during the current year; but most of the analysis of these data will be done during the coming year. Three kinds of studies are envisioned with the Data Bank materials.

Studies of Stability and Change in Teaching Behavior. The lessons on which a major portion of the data in the Bank are based were taught at the beginning and end of the 1967 summer training session. The extent to which interns' teaching behaviors have changed over time will be determined from a third lesson to be taught in the spring of 1968. These studies will also utilize the information (videotaped microteaching lessons) gathered during the summer at the actual time of the skill training.

Effectiveness Studies. The Data Bank provides an opportunity for further studies along the lines of those already done on "explaining behavior." Two studies in progress, described above, enlarge the notion of effective teaching to include other categories of teacher behavior. Studies in this category compare teachers whose students have learned best with those whose students have learned least well as measured by adjusted mean scores on achievement tests given at the end of the lesson.

Correlates on Teaching Style and Effectiveness. Personality, achievement, and aptitude data on the interns comprise part of the Data Bank. These data will be correlated with various measures of teaching style and teaching effectiveness. One long-term goal of this kind of study is the development of a set of predictors for identifying trainees most likely to be responsive to various training strategies. Already underway is a study of relationship between various attitude measures of authoritarian tendencies, attitudes toward educational progressivism, etc., on the one hand, and measures based on videotaped teaching behavior records, on the other.

The Data Bank is a rich resource and a general plan has been developed for conducting studies over the next two to four years with this information. The Bank is presently organized so that these studies can be done continuously. It is expected that, as these studies are completed, they will suggest new questions and approaches relevant to the understanding of the processes underlying the data.

Members of the Stanford faculty have been informed of the availability of these data and encouraged to submit proposals for using them. The Center regards the Data Bank as a resource available to competent investigators and wishes to have the data exploited fully.

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b. ENVIRONMENT FOR TEACHING

The environment for teaching, one of the Center's major research domains, consists of organizational conditions and arrangements that significantly affect teaching and teachers. Teaching today is shaped by crisis and change--the crisis of a dysfunctional school experience for too many of the nation's children and youth, and change as a consequence of organizational and technological innovation. We are interested in this environmental context of crisis and change and in those environmental variables which constrain or support effective teaching.

The environment we believe to be most necessary for effective teaching and which we seek to develop is one that we call the "open" school. While the idea of an open school is subject to different interpretations, it is here seen as characterized by high organizational flexibility. More specifically it would reflect:

1. arrangements for a genuinely collaborative effort with the community (or neighborhood) which it serves
2. a differentiated staffing plan which recognizes the requirements of the several teaching functions to be performed and their various demands on staff competence
3. a flexible schedule that concerns itself with time, group size, teacher-pupil contact, and pupil progress variables
4. a decision-making arrangement whereby the professional direction of the school rests with the faculty
5. provisions which place responsibility on staff members for continuing career development

6. a school plant that is itself flexible and consistent with the overall organizational flexibility sought.

While this characterization is not inclusive and needs further development, it is, we feel, immediately relevant to the Center's focus on teaching.

Ultimately, the persons working in this problem area propose to engage in projects covering the full range of the research-development continuum which is the Center's responsibility. The immediate question is one of locating on this continuum or plans for the next year--and for the next five years. Clearly, our long-range developmental goal is to place in operation one or more proto-typical open schools but it would be premature to initiate such a developmental activity in the coming year. A more appropriate effort to begin movement toward the model open school is to test the environmental variables of teaching through further research. We need to find out more about what we already "know" or are doing organizationally before we begin to build a model open school. That is, we need better answers to such questions as:

1. What effect does flexible scheduling have on teacher satisfaction, effectiveness, and patterns of teacher-student interaction?
2. How do the effects on teachers of collegial evaluation differ from those of principal-administered teacher evaluations?
3. What images of the school environment do teachers and pupils have and how do these images affect behavior and aspirations?
4. What characteristics of a community affect teacher-student relations?

5. What is the effect of open-space classrooms on teacher-pupil interaction?
6. What are effective ways of introducing specific innovations requiring substantial modification in teacher behavior?
7. What changes in organizational characteristics of the school environment will improve its supportiveness for the beginning teacher?

These and other questions reflect a commitment to conduct research on problems crucial in the development of the model open school we seek to develop. The projects described below reflect a decision to inquire further into selected aspects of the environmental context of teaching, and a commitment to programmatic research and development in this problem area. Projects for 1968-69 will be conducted by new members of the Center staff from the Department of Sociology and of the Graduate School of Business, in addition to present staff from the School of Education.

Professional Socialization of the Teacher and His Career Development

(G.W. Sowards and R. Warren)

In 1967-68, this project focused primarily on how the socialization effects of the first year of teaching affect the beginning teacher's sense of autonomy and definition of the successful teacher. In this first year, the data collected probed a wide range of potentially important socialization variables. Consequently, there is considerable latitude with respect to the direction the research can take in the coming year(s).

At the present time, largely as a result of this past year's work, a paramount interest of the project directors is the process of "inducting" the beginning teacher and "resocializing" the experienced teacher who changes from one school system to another. Little is known about the way teacher behavior is shaped by these processes. To some extent, of course, teacher behavior is a function of individual personality, but there is reason to believe it is also a function of the effects of certain organizational characteristics. It is this set of interactions in which we are particularly interested.

Within a school district and within each school in that district, there is an identifiable process of "induction" and "resocialization," both formal and informal. Further, this process varies considerably across school districts and across schools as a function of such variables as nature of client group to be served, percent of teachers who are new (beginners or experienced) to the school system or school, the structural tightness or looseness of the system, assumptions about the competence of beginning teachers and of those experienced but new to the system, etc. We intend to describe this "induction" and "resocialization" process more adequately, to assess its impact on teacher behavior with more certainty, and, ultimately, to be able to advise school systems on the most probable outcomes, in terms of teacher behaviors, of specific ways of arranging for beginners' initial year of teaching and for experienced teachers' first year of work in a new school system.

We are particularly interested in the relation of effective teaching environment to the open school which we hope ultimately to develop. As we envision that school, it makes particular demands on teacher behavior broadly conceived in terms of attitudes, skills, etc. For example, teachers who would staff such a school must have a strong client (pupil) orientation, a desire for close and continuing contact with parents, a predisposition to work closely with colleagues, a sense of responsibility for the total effort of the school and not just for their own class assignment.

The early "induction" experiences of a teacher as he enters the profession have a great deal to do with the realization of these kinds of behaviors. We also see problems in the "resocialization" of experienced teachers originally inducted into "closed" schools but now called upon to teach in "open" schools. We must understand better the ways in which certain organizational elements can be manipulated to support and not thwart teacher development.

Some of the questions we are interested in answering are:

1. To what sort of role model or teacher stereotype is the beginning teacher committed at the conclusion of training and entry into service? The experienced teacher, at a given point in his career?
2. In selecting positions, do teachers make a conscious effort to contract with a school system whose expectancies they see as being compatible with their role model?
3. What is the significance of a school system's teachers selection criteria and procedures to the "induction" experience or the "resocialization" experience?
4. What formal and informal arrangements are made in a school system or school to carry out the "induction" process or the "resocialization" process, and what are their consequences for selected areas of teacher behavior?

5. How are the formal and informal induction efforts of a school system or school perceived by the beginning teacher and by the "new" experienced teacher?
6. What happens when a beginning teacher is seen as being in serious trouble? What constitutes trouble? Who defines it as trouble? What actions are taken, by whom, with what results?
7. Who becomes a "significant other" for the teacher with respect to the "induction" process? What roles do parents, children, colleagues, and superordinates play?

We assume that his success in teaching is perceived by the beginning teacher to be problematic. Hence, his survival as a teacher depends to a considerable degree on the supportive and instructive value of the "induction" process. Further, we suspect that the same is true for experienced teachers new to a given school system. In other words, the extent to which the environment helps with problems the teacher feels inadequate to solve alone measurably influences his commitment to and satisfaction with the job.

In 1968-69 we plan to concentrate on a study of beginning teachers and their "induction" experience and of experienced teachers who change jobs and their "resocialization" experience. We will continue to work in the school district where we initiated last year's research and will add the schools of at least one other district as working sites. The additional research sites will make possible the inclusion of schools representing a wide range of socio-economic and organizational variation. They will also facilitate the identification and study of teachers who differ on some of the variables suggested by the requirements of the "open" school.

It is hoped that, by the end of 1968-69, our investigation will allow us to state certain hypotheses concerning the "induction" and "resocialization" processes. Then, in 1969-70 our efforts can be largely devoted to their test. Depending on the outcomes of these efforts, the focus of this project in the years after 1969-70 may include any one of several kinds of activities. Perhaps in 1970-71 a set of specifications for designing effective "induction" and "resocialization" processes can be developed for dissemination to school systems. It may also be important by then to extend the research back into teacher training institutions and examine those conditions and experiences significant for the "induction" process of the open school.

Case Studies of Teacher Behavior in Elementary Schools

This project, initiated in 1967-68, will continue to focus in the coming year on a comparative analysis of the teacher role in traditional and innovative elementary schools. Such innovations as open-space classrooms, non-graded classes, and team teaching are said to enhance the teaching role and to contribute to a more meaningful school experience for both teachers and students. The aim of the project is to identify and examine teacher behavior which is modified, and that which is not modified, by such innovations.

The background for this project is an interest in an ethnography of the teacher experience--in studying the characteristics and demands of the teaching role as reflected, in particular, in the teacher's patterns of interaction with others. For this research, it is useful to characterize teaching as a series of social encounters whose significance varies according to (1) the activity which provides a rationale for the encounter, (2) the particular population creating the social dimensions and dynamics of the encounter, and (3) the physical setting, including material resources, in which the encounter takes place.

At present, such encounters are being identified according to the physical setting where they occur, i.e., the classroom, the playground, the auditorium, the cafeteria, the teachers' lounge. Within each of these settings, encounters vary according to the population of the setting, the activity undertaken, and the intended goal. The kinds of questions which can be asked about each encounter have a wide range of specificity. For example: How often does it occur? What specific decision does it demand of the teacher and what "degree of freedom" does the teacher have in making the decision? To what extent and in what way is it supportive of the teacher's classroom management responsibilities? What physical activity is involved? What importance does it have to the teacher in terms of job satisfaction?

In the coming year, the project will continue to study teacher behavior in the traditional school and begin a study of teacher behavior in a more innovative, open school. It is difficult, however, to anticipate the point at which the study of the former can be logically terminated. The school is located in a rapidly growing metropolitan community and in a district in that community where growth is most accelerated. School district officials have recently decided to transfer at the end of this school year almost two-thirds of the pupils in the elementary school under study to other nearby schools--in order to leave room for children from housing tracts springing up in the immediate vicinity of the school. The new housing tracts represent for the school a somewhat different constituency with respect to socio-economic characteristics. Consequently, since parental involvement in the life of the school is considered to be an important aspect of the study, these developments may make possible useful comparative analyses, particularly with regard to socio-economic variables affecting teacher-parent relations. With this possible extension of the study of the traditional school and in anticipation of a study of an innovative school, this project is being planned to extend to June, 1970.

The Innovative Organization: Research Design for an Exploratory Study of Innovations in Teaching: Material and Method

The proposed research uses a rigorous field study methodology employing a highly structured and exhaustive interview technique. The focus of this research is upon the decision activity that leads to either the introduction or the failure of introduction of new teaching materials or methods into an organization. The study will produce a series of measures to test important theoretical propositions on the organizational innovation process.*

The proposed study will employ a general set of procedures to explore a wide range of propositions and theories about the process of organizational change. The information obtained will represent an

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*The methodology represents a refinement of sociometric measurement procedures to focus on decision activity. cf.
J. S. Coleman, E. Katz, and H. Menzel "The diffusion of an innovation among physicians," Sociometry, 1957, 20, 253-270;
J. L. Moreno and H. H. Jennings, 'Sociometric measurement of social configurations," Sociometry Monographs, No. 3, 1945.

important step toward the construction of a more comprehensive and accurate description of the innovation process. The findings will then provide valuable information for the innovation plans to be used in the following years. Those plans will serve as guidelines for introducing change in teaching materials and methods to creat open schools.

The open school is characterized by high organizational flexibility, and, therefore, will be highly innovative as it continually evolves and adopts new teaching methods and structures to generate a more effective teaching environment.

While we recognize the value of new developments in teaching, we need to develop specific procedures by which we introduce the innovations. To develop these innovative procedures, we must first generate knowledge about the most effective way to introduce them.

The aim of this project will be to generate a set of procedures, innovation plans, that will be used to develop open schools. The major effort on this project for next year will be to carry out a study producing information needed to create innovation plans for the various characteristics of open schools.

The Professional in a Bureaucratic Organization: Teachers in Schools

(W. Richard Scott and Sanford M. Dornbusch)

The professional and the bureaucratic modes of organizing work are based on different and partially conflicting principles concerning how work is to be divided, where decision making power rests, how work is to be coordinated, and how performance is to be evaluated. These competing principles generate tensions, conflicts, and misunderstandings among participants. Such problems, coupled with the fact that increasing numbers of professionally trained persons are employed in bureaucratized organizations, add practical importance to the theoretical significance of this subject area. Teachers, as they become more professional, increasingly confront these problems.

Numerous studies of the conflicts and accommodations which occur when professionals are employed in organizations have been carried out in a variety of settings. Scott has done one such study involving social workers and has written numerous articles on the subject. Curiously enough, such studies have seldom been carried out in secondary schools (see Bidwell, 1965, p. 992*), and only a few have been conducted in the college setting. Although suggestive, results from studies of social workers, engineers, scientists, physicians, etc., cannot be directly extrapolated to teachers in the school setting because of differences in degree of professional orientation, differences in the meaning of professional orientation, and adjustive organizational mechanisms which may be unique to the school setting.

Our studies of this problem area would be closely related to our research on authority relations and the evaluation of performance. Our previous research has involved both professional and nonprofessional work. It indicates that the professionalization variable and organizational responses to it constitute a major source of instability of authority relations and disputes over the criteria of evaluation and the credentials of evaluators. Research on teachers in a variety of settings will be used to test and amplify this assertion.

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*Charles E. Bidwell, "The school as a formal organization." In J. March (Ed.), Handbook of organizations. Chicago: Rand McNally, 1965. pp. 972-1022.

Status Orientation of Teachers and their Professional Behavior

(Elizabeth G. Cohen and John W. Meyer)

This project will study the ways in which the classroom behavior of teachers may be affected by their background of upward social mobility or an anticipation of future social mobility. The intellectual antecedents of the study lie in Cohen's article on the status of the teacher in the June 1967 issue of the Review of Educational Research. It is noted there that (1) a high proportion of teachers come from working class backgrounds and (2) such upwardly mobile individuals are known to have relatively high "bureaucratic" rather than "professional" orientations. Obviously, teaching is a mobility route for many people, but it may only be the first step in mobility. The second step may be the move from teaching to administration, since there are few ways for status-striving individuals to move ahead within the field of classroom teaching.

This kind of status-enhancing orientation may very well lead to less student-oriented behavior in the classroom, less willingness to engage in overt conflict with administrators, and more conformity to organizational chores like bookkeeping and maintaining classroom discipline.

Such a study would have clear implications for the selection of teachers for disadvantaged students, where a high degree of client (rather than administrative) orientation is required. It might also suggest the provision of alternative modes for advancement within the structure of teaching to more effectively involve competent status-striving individuals.

This study will lead to the design of further studies of the teacher's role. The crucial points to be examined are the character of the social role the teacher assumes and those attributes of the school context or of the background of the teacher which determine this role.

Patterns of Evaluation and Authority in Schools

(Sanford M. Dornbusch and W. Richard Scott)

Over the past four years, a new conception of authority systems in formal organizations has been developed at Stanford. Authority systems are analyzed in terms of the process by which the performance of organizational participants is evaluated. It has been successfully applied to five organizations in the United States and two in Nigeria. Recently, advanced students in education have been pointing to the relevance of this research to the school context. One student is planning to apply our approach to three nearby school districts. We have begun to plan further research on problems in the evaluation of teachers and their effect on the stability of the authority structure of the school.

Among the topics to be investigated are (a) the degree of consensus on the authority structure, (b) the extent to which the perceptions of the authority structure of persons high in the school hierarchy are similar to those of persons lower in the structure, and (c) the differential receptivity of teachers to guidance provided by persons higher in the structure. Knowledge on such issues will, at a developmental level, permit more rational employment of the school system to further innovation and to create satisfaction among teachers.

Educational Effects of School Context: Effects on Educational Aspirations (C. Norman Alexander)

The educational aspirations of an individual are expected to be shaped by his perspective on the occupational structure. Cognitive assessments of the prestige of various occupations and the requirements that set barriers to their attainment have been shown to vary systematically with the socio-economic status of the perceiver. Previous research has also shown, however, that school composition affects the occupational perspectives and aspirations of adolescents. This study proposes to observe adolescents prior to and following a shift in the socio-economic composition of their school classes (as they move from junior to senior high schools of markedly different status compositions).

Questionnaire observations will focus on the process of change and the extent to which changes in occupational cognitions are associated with changes in aspiration levels. If "total" shifts in socio-economic environments change occupational perspectives and aspirations, it may be worthwhile to attempt such change "informationally." Perhaps, at a later stage of research, classes of students in "under-aspiring" schools could be given courses communicating facts about the occupational hierarchy that are most likely to affect educational and occupational aspirations.

This research will cast light on how occupational cognitions affect the educational aspirations of students and, therefore, the effectiveness of teachers. By many students the school is mainly perceived as a medium for learning job-related skills. By others, it is perceived as an empty universe, separated from the problems of the work-a-day world. In both cases, knowledge of occupational aspirations and cognitions will make it more feasible for the teacher to understand the motives of his students and provide a more effective atmosphere for learning.

Educational Effects of School Context: The Effects of Organizational Context on Student Aspirations (John W. Meyer)

Starting from a theoretical position taken in a paper on the effects of colleges, Meyer has been carrying out a series of quantitative studies on the effects of the organizational context on the aspirations of students. Using data on many students in many high schools, he has studied how organizational features of the school affect the self-concepts of the students and in other ways teach them to expect and aim for college. Another effort has been to discover, with similar data on college students, how colleges channel students into different career lines.

These studies have already produced interesting findings. For example, high schools with students of generally higher social class backgrounds are more likely to send students of given background and ability to college. But if such schools have students of exceptionally high ability, any given student is less likely to aspire to go to college. Presumably, as the competitive standards set by the students in general and the school organization rise, any given student's academic self-esteem may fall.

Similarly complex findings arise in the study of colleges. Increases in the competitive level of the college may sometimes lower the aspirations of the students.

These studies will be carried further within the framework of the proposed study. Their intent is to develop knowledge of the way in which schools as contexts for learning affect the individual student's reaction to his teacher, his environment for learning, and his images of the future.

Investigation of the Feasibility of a Contextual Data Bank

(John W. Meyer)

Exploratory work on the feasibility of creating a contextual data bank will be done could such a bank increase the opportunities for research and especially research training on problems of the organizational context of education. Complex contextual analyses require very large amounts of data. Students, and often researchers, cannot hope to collect such data for a thesis or seminar project. For this reason, only a few students are now being trained at Stanford to do this crucial kind of educational research. It requires collecting data already gathered by large scale studies around the country and preparing it for computer analysis. Such data on many students in many schools have been and are being gathered--for example, by Project Talent, the American Council for Education, the National Opinion Research Center, and the U. S. Office of Education. The proposed data bank could bring such data together and make it available for analysis. As it develops, it would provide material for many studies and make possible essential research training.

The presence of a Contextual Data Bank at Stanford would provide an opportunity for secondary analyses of data by interested students of the teaching process. Often data collected for one purpose can serve equally important purposes for other researchers. The sheer number of cases available for graduate students in education and faculty at Stanford would provide a major resource for the testing of hypotheses requiring large samples in diverse settings.

The following studies may be undertaken within the next year if progress on other projects already described, permits.

Effects of Different Evaluative Criteria on the Teacher's Attitude and Performance (W. Richard Scott and Sanford M. Dornbusch)

Since our conception of authority rests on the evaluation process, it is a logical extension to study how evaluation shapes the behavior of those being evaluated. Teachers, we hypothesize, are affected by the criteria used in evaluating their work. One current study at the Center is correlating the evaluative criteria of principals and the perceptions of new teachers. This approach will be applied beyond the study of occupational socialization to the study of the direction and level of teacher effort.

This approach can also be employed to determine the way in which evaluative criteria interact with the characteristics of the students and community from which the students are drawn. Teachers perceive themselves as faced with different problems when their students are motivated and bright from those that arise when their students unmotivated and deprived. Principals and other supervisors, aware of these differences, shape the criteria which they use for the judgement of good teaching in terms of their perception of the teacher's problems. We will focus on misunderstandings and variation in the perception of what is important in the teacher's work.

Effects of Principal's Use of Sanctions upon the Principal-Teacher Authority Relation

(W. Richard Scott)

A peculiar and little-understood relation appears to obtain between the use of power and the exercise of authority in formal organizations. On the one hand, an organization's authority structure is based upon and supported by its power structure--that is, individuals given the right to issue directives and commands are also empowered to administer sanctions. On the other hand, several observers have noted that the exercise of sanctions appears to be inconsistent with or to constitute an attack upon the authority structure. It is this paradox that we hope to better understand by carrying out exploratory studies in school systems.

Among the topics covered in this study are the principal's perception of the sanction available to him to control his teachers, as well as the teacher's perception of the rewards and penalties available to the principal. This topic is crucial in a situation where movement towards professional status of teachers, union activity by teachers, and movements towards relating compensation to performance all interact to create a shifting, fluid, and perhaps misunderstood relationship between the principal and his teachers. It is also possible that we will investigate the importance of sanctions perceived by exceptional teachers, those whose performance is rated very high by their peers as well as their superiors. What sanctions motivate them to continue to teach well and care about teaching?

The Relative Power of Lower-Status Students: Team Teaching in the Disadvantaged Setting (Elizabeth G. Cohen)

This study of the organizational context of teaching comes out of Cohen's research and teaching on the disadvantaged child in the school setting and an interest in the theory of status characteristics. The basic design would involve experimenting with raising the power of the low status child vis-a-vis his teacher by (1) taking the power of evaluation out of the hands of a single teacher; (2) having the teacher play the role of a technician subordinate to the child's own goals; and (3) shifting the emotional support role from the teacher to a paraprofessional member of a teaching team. Research on this critical problem in the use of team teaching in the disadvantaged setting might suggest organizational changes that would provoke more active, striving behavior in students.

This research is unusual in the manner in which it brings into focus (a) changes in the organization of teaching (team teaching), (b) knowledge concerning the disadvantaged child and his relationship with his teacher, and (c) a theory of status characteristics whose theoretical power is now being demonstrated in a series of experiments at Stanford University. It seeks to change the structure of the teaching situation and thereby produce changes in the behavior of students as they work with the teacher towards meaningful goals.

The Interaction of School and Family Influences upon the Educational Goals of Students (Paul Wallin)

In recent years, Wallin's research has centered on the problem of how variations in the social composition of school populations influence the educational goals of high school students. The first major study of this question is presented in his report, with Leslie C. Waldo, *Social Class Background of 8th Grade Pupils, Social Class Composition of Their Schools, Their Academic Aspirations and School Adjustment*. (office of Education, Project 1935). The most important finding of the study was that the social class composition of the school did not influence educational aspirations when account was taken of parents' aspirations for their children.

Studies of 10th grade boys are currently underway, parallel to the foregoing research. In the coming year, it is expected that problems arising out of the present studies will be pursued. Research on the impact of the family and the school upon the educational goals of girls is a necessary further step in understanding the interaction of school, social class, and parental aspirations. It is becoming increasingly clear that improvement of teaching in American schools requires much greater knowledge of the community in which the school is located as well as the way in which community values, mediated by the family, are passed on to the student.

c. TEACHING THE DISADVANTAGED

Evidence of something seriously wrong with education in the United States as it serves low-income groups has been mounting for years. The most obvious manifestations of this problem are the nation-wide urban riots involving school-age Negro youth, confrontations between white school boards and Negro parents, and organized efforts to influence educational programs by Mexican-Americans, American Indians, Puerto Ricans, and migrant labor groups. As this social evidence of basic dissatisfaction inreases, formal educational statistics and research findings are serving to identify specific failures in the education of the poor. Educational scholars, minority group leaders, and students of our social fabric have been writing about the unmet educational needs of the disadvantaged and the weaknesses of our traditional programs for more than a century. But it has taken the Negro revolt of the last decade, the recent "discovery" of the poor, and the launching of "new Frontier," the "Great Society," and the "War on Poverty" to stimulate serious experimentation with new approaches.

The news media continually reflect the growing consensus among intellectual and governmenal leaders. The concern of R. Sargeant Shriver, former Director of the Office of Economic Opportunity, is typical. He asserted that the present elementary school system was "critically inadequate to meet the needs of children of poverty." Similarly, James E. Allen, Jr., New York State Education Commissioner, recently told the New York City Board of Education that it must improve schools in the slums immediately. He posed the following questions to a number of educators: What kinds of schools will turn the tide of hope in the ghettos? What patterns of cooperation involving whites, Negores, business, industry, labor, and government can rejuvenate slum area schools? What can be done to assure parents in the slum areas of a more meaningful role in schools in the education of their children? (The New York Times, November 28, 1966, pp. 1, 42) Congress and various federal agencies, in response to these concerns, have established an array of new educational programs funded through the U.S. Office of Education, the Office of Economic Opportunity, and the Departments of Labor, Interior, and Defense. The dominant goal in improving the education of economically disadvantaged children has been to bring their schools and teachers up to the standards of schools attended by more fortunate children. But the disadvantaged student rejects the conventional educational system, first by failing to achieve its curricular objectives, and ultimately by dropping out of it. His parents and community tend to ignore it as another elaborate and indifferent bureaucracy which they have little power to influence.

The plight of the disadvanted has forced attention to chronic and pervasive flaws in the educationl system. If educational goals are hypocritical and unrealistic, if teachers don't talk like real people, if the activities in the school are distant from the reality of the lives of those they serve, an imperative for educational research and development is clear. Historically, educational programs have been shaped by a limited and relatively homogeneous clientele. The prevailing systems of teaching are not attuned to an increasingly technological society that demands life-long adaptability to swift change and presents an increasingly diverse population of learners.

Thus far, the emphasis of compensatory education programs has been on the learner. Diagnosis of the disadvantaged child's educational and psychological deficiencies has led, naturally enough, to programs of rehabilitation designed to fit the child to the existing educational system. Yet the most concentrated and well-known compensatory education programs--New York's Higher Horizons and More Effective School Programs, the Ford Foundation's Great Cities Program for School Improvement, Title I of the ESEA, and Project Head Start--have not significantly or permanently improved academic performance. Heavy investments have been made in programs emphasizing the "rehabilitation" of pupils rather than the studied reformation of a failing system. This is not to say that current compensatory education efforts constitute an irreparable error. Those engaged in research and compensatory projects have been forced to re-examine assumptions about teaching, learning, and their social context. The results of these re-examinations are likely to have implications for the education of children in all schools.

We believe that research and development on the education of the economically disadvantaged must itself become involved in the socio-psychological setting of the schools. Parents, community groups, and teachers must become participants in, rather than objects of, the design of education.

Obviously, the Stanford Center for Research and Development in Teaching can play only a highly specialized and limited role in finding solutions to these large educational problems. The teacher and the teaching process are the primary objects of our concern. The teacher, closest to the learner and the final filter of all educational designs, is often remote from the cultural life of the disadvantaged child, unable to influence decisions about the curriculum he attempts to translate to the child, and inadequately supported by training and resources to overcome the barriers separating the disadvantaged pupil from relevant educational experiences.

This proposed program of research and development attempts to concentrate a portion of the resources available to this Center on a cycle of research-development-research on teaching the disadvantaged. By making use of the experience and skills peculiar to this Center, the program is designed to lay a base of rigorous research for interventions in the systems of teaching in impoverished communities.

A Community-Centered Teaching Laboratory

The main purpose of the public school system is to provide the best possible learning experiences for a particular population of children. It is quite clear that in many instances schools are failing large groups of children--particularly the disadvantaged. Schools in economically depressed areas have grown increasingly distant from the basic concerns of their students. Schooling in these areas has been for the most part a dismal and frustrating failure. Community participation in the planning of school experiences (teaching) for children has been absent. The politics involved in initiating, effecting, and maintaining change in a system built on values irrelevent, for the most part, for the students which they serve, make it difficult for the community to work effectively with the school.

This program will try out a means for entering an economically deprived community to conduct basic research and development on the teaching processes. The aims of the approach are to develop teaching programs that have relevance and meaning for the students, actively engage parents and local community leaders in the training of competence, develop programs for the retraining of experienced teachers, and the training of new teachers of the disadvantaged.

As an intervention strategy, we are proposing that a Community-Centered Teaching Laboratory be instituted. Such a facility would be located in the community that it serves. The Laboratory would be a project of the Center, and its function would be to conduct research and development on teaching the economically disadvantaged. Its aims would be to find effective teaching techniques for increasing the personal and academic competence of disadvantaged children.

The Teaching Laboratory would serve both as a laboratory and as a field station within the community. It would serve to link community life, concerns of parents, formal institutions and agencies that presently exist in the community, and teaching in the school. Planning, strategies for intervention, design, implementation, and testing would be conducted within this Laboratory.

The Laboratory would serve for a period to two or three years. At that time, it would be expected that the Laboratory would be phased out as an operating entity. The tested programs developed within the Laboratory would be then instituted in the schools of the community.

Diagnostic and Developmental Field Study

Professionals attempting to introduce changes often fail to consider the feelings, thoughts, and attitudes of the participants in the teaching system. Too frequently, the thinking of the participants is dismissed as not helpful in identifying core problems or in finding solutions. Efforts to involve the participants of the system have been so time consuming and of such little value to the innovator that the effort is seen as unproductive. Yet those concerned with the problems of educating the economically disadvantaged child regard the involvement of the participants as exceedingly important. Towards this objective, the following approach is suggested.

Step 1. Selecting Useful Informants: The first step is to identify meaningful actors in the situation who will provide a variety of views about the operations of the school. These people should include parents, teachers, students, and administrators. Students can be nominated by a simple procedure involving not only the "best" student leaders but also the average student and the low achiever who is actively anti-school. Teachers, such as homeroom teachers, are asked to identify specific students in each of the above categories. From a composite list, a smaller group of students (representing each group) is selected to participate. The administration can in turn nominate teachers who represent different segments of the teaching faculty, again, not just those members of the faculty who are "pro-school" but also those who are neutral or anti-school. All relevant members of the administrative team of the building would also be involved. Parents could be those of children who are picked, plus an additional group to keep the numbers sufficiently large to represent divergent opinions.

Step 2. Opinion Sampling: The second step is to set up four "informant groups" of parents, teachers, administrators, and students. The group's task would be to identify the problems they know about. This would be done in a taped brainstorming session in which the groups would attempt to identify as many areas of concern as possible. The four group tapes would then be edited into composite stimulus tapes.

Step 3. Stimulus Material Discussions--I: The tapes from each of the four groups would be exchanged for review, according to a three-step procedure entailing, for each group, (1) validation of what they are hearing; (2) reaction to what they are hearing; and (3) response to the challenge that they are hearing on the tapes. Each group would hear every other group's composite tape (a minimum of four sessions). The activities of the four groups would then be written up and a composite tape would be made.

Step 4. Identification of the Etiology of Complaints: Each group would then undertake to develop the etiological picture of how the condition or problem came to exist. In many cases, these would only be guesses, but the important matter is to establish how each particular group sees the problem. They would attempt to identify the forces that contribute to the problem and their changeability. These forces would be those located outside the school, within the school system, within the school building, and in specific actors (including self).

Step 5. Stimulus Material Discussion--II: The written records compiled by each group indicated above would then be exchanged so that each group could validate and react to the statements made by the other groups, respond to their challenge, and evaluate their solutions.

Step 6. Planning for Change in Heterogeneous Groups: This step would bring together four groups composed of participants from each of the four original groups. The purpose of these mixed groups would be to find agreement among its members on the problems posed; establish priorities for working on the problems as they see them; add any new reactions, priorities, or problems to the list; and develop a "position paper" to be sent to the total group.

Step 7. Develop Mixed Work Groups to Work on the Problems Identified: The purpose of this step is to come to grips with the problem and pose solutions on which it can reach consensus. Its deliberations should include priority setting. Identification of strategies would also be part of the work.

Step 8. Report the Recommendations of Each Group to the Entire Body of Persons Working on the Problem: The purpose of this set of meetings would be to attempt to (1) obtain some consensus from the relevant actors as to the directions which should be taken; (2) mobilize appropriate manpower to help in the solution or intervention try-out; and (3) establish a relevant reference group for the change process which can give some weight to the recommendations going to the building or school system as a whole.

A Manual for Restructuring School-Community-Teacher Relations in Impoverished Areas

As noted earlier, present systems of teaching are failing to involve low-income youth in the educational process. In growing urban school systems, where an increasing proportion of the population are members of minority groups, the schools are failing to address themselves to the social, political, and economic issues framing the lives of the population they serve. Techniques are being sought to empower minority group and low-income neighborhoods to develop skills for influencing their educational institutions. The local community needs the competence to assess the effectiveness of the educational program, to develop alternate educational policies, and to persuasively and effectively translate their interests and goals into the means required to achieve them. It is, of course, necessary for the school and the community to identify those decisions belonging exclusively to iether the local community or the professionals, and those which must be shared. The Community Action Program of the Office of Economic Opportunity has been developing techniques and skilled personnel for increasing these neighborhood competencies for the last several years. This program has not, however, addressed itself to the educational problems of low-income groups. This project will adapt, test, and develop similar techniques for restructuring the relations between teachers, agencies of formal education, and impoverished communities.

To develop and test these methods, a team, including teachers, an experienced Community Action specialist, educational researchers, and representatives of the community, would be formed. This team would design and test handbooks and similar devices for (a) the use of community residents as foster teachers in non-school hours, (b) the training of parents to support the education of their children, and (c) the work of policy-making school-community committees, parents' clubs, and mutual aid committees in dealing with social agencies of the community in relation to school problems. The Community-Centered Teaching Laboratory would provide the base for these activities in the community for the first two years. This project would be closely coordinated with the Center's program on the "open school" and would work hand in hand with the diagnostic and developmental field study described above.

The Use of Small Groups to Improve Academic Competence and Self-Respect of Economically Disadvantaged Children

This project would be directed to students whose behavior in schools had identified them as "failures" and problem students. Within the first two years of the Teaching Laboratory, we would conduct research with these students after the school day. We propose to help them become more effective by using the strong interpersonal forces that can be developed within carefully composed and directed small groups. The treatment on behalv of the students would consist of (a) composing and changing the composition of the groups of students who come to the Teaching Laboratory; (b) setting tasks appropriate for the groups; (c) raising questions for discussion; (d) providing older students as resources and as tutors (this involves our training of older students); and (e) supporting the small groups with an expectation-setting and planning board of the Teaching Laboratory.

The purpose of the project would be to develop, operate, and evaluate a practical method for schools to use in helping disadvantaged "problem" students become productive learners. This will involve the identification of students in the school population and the construction of small groups as milieux within which the students may interact, find ego support, correct misperceptions, strengthen aspirations, and reduce the ambivalences and anxieties that limit their capacity to deal effectively with their environment. The method maximizes peer-group influences and minimizes adult intervention. The method would be developed and tested with 30 students selected from the community in which the Teaching Laboratory is located.

The project will show (a) what proportion of the students were helped, (b) what sort of problems were alleviated and which ones were not,(c) what demands were made on the research staff, teachers, other officials, and parents, (d) what screening measures predicted which students could and could not be helped, and (e) will also develop and validate principles for combining these students into adaptive groups, (f) establish relationships among aptitudes, and (g) document the growth of the small groups, participation patterns of members, and changes in classroom behaviors. The project should also lead to recommendations for the simplest and least expensive procedures for implementing similar programs.

Present efforts of schools to help the disadvantaged student are largely ineffectual. The device now in widest use is the "track" system, which segregates students by "ability." Research evidence by no means supports this system, and there are strong theoretical objections to it. Invividual counseling has made no significant difference in the performance of disadvantaged students. The relevance of school to the needs and desires of the students has become increasingly distant.

The basic design of the present proposal assumes that disadvantaged students have a variety of assessable aptitudes. Such assessment will serve as a basis for carefully composing small groups to serve as adaptive milieux. The project would compose two fifteen-member student groups.An adult leader (a Center Associate) would be responsible for the meetings of the groups. The students would be told that they have a variety of aptitudes which make their individual contributions to the group unique, and that their primary function would be to learn skills that would enable them to tutor younger children. Each group of students would be required to meet at the Teaching Laboratory three hours per week. The proposed research plan and the projected research findings would have applicability to communities throughout the country. It would be significant in its attempt to use the virtually ignored power of interpersonal and social forces among students to improve their effectiveness as persons and as learners. This power,its forms and processes, has been demonstrated in laboratory and field studies, but its use through control of group composition remains largely undeveloped.

The plan is also significant in that it calls for the minimum possible adult intervention, can be operated and guided by a minimum staff of trained personnel, and does not depend for its success on remaking, reorienting, or revamping the social institutions existent in the local community. It will suggest a variety of retraining and training techniques for the teacher.

It is expected that the research will indicate (a) what difference the adaptive milieux (small groups) makes in the ability of students to exercise tutorial effectiveness; what sorts of procedures or interventions serve to change most and least the behavior of the students within the small groups; what aptitudes of the participating students change most and least in the adaptive milieux; how participation in the small groups relates to changes in student performance in school and to adaptiveness of participation in small groups and in planning groups; and how well the combining principles work.

It is expected that a series of manuals, motion picture films, and other dissemination and training devices will flow out of this laboratory experience. It is further expected that, at the end of the first year, the small-group tutorial principles will be applied to a larger population of students, and that the original group of 30 students will serve as resource persons for the "seeding" of the newer groups. The tutorial groups will be used within the school system on a regular basis as part of the scheduled classroom interaction.

The Interaction of Teacher and Curriculum in Slum Schools

It is the interaction of teacher and curriculum that confronts the disadvantaged student in school. What the teacher does and says translates the prescribed curricular program into the daily experience of pupils. This project proposes to develop teacher-curriculum interactions that deliverately move away from the conventional modes of schooling and, instead, invite immediate and productive participation in learning activities.

School, for slum children, has become the place where they are confronted with their inadequacies and where, at best, they are asked to try and try harder to improve in tasks that do not appear important to them.

Kindly, well-intentioned teachers tell them in gestures, intonations, and words, "You're not doing very well now, but, if you try, you can do better. We'll help you." This may be a fine incentive for a child who knows he's a person of worth, has confidence in his capacities, and wants to do better in the tasks the school delineates for him. This is especially true when parents assure him these tasks are important.

For the slum child, the tasks may seem irrelevant. It is increasingly clear that school must make greater sense to its students and parents. Teacher and curriculum must clearly demonstrate that life can be more rewarding as one grows in power through the activities the school affords.

It is therefore proposed that the Center undertake the development of teacher-curriculum interactions that depart from the conventional modes of school experience, and, in collaboration with the community and teams of teaching personnel, attempt to shape school activities highly relevant to life as-it-is-lived in the community but also so open-ended that individuals may respond in terms of personal life styles and goals.

To accomplish this, it is suggested that the following conditions should prevail: Determining the content and goals of the school experience must be the joint project of community and school staff. This implies that the teaching staff must have a real knowledge of and working relationship with the community, especially the parents, and that parents must be involved very directly in defining what they want for their children--what makes sense from their point of view. The teaching staff will have the dual task of becoming participants in this community venture and, at the same time, widening the awareness of parents that new ways of learning may be more effective than the traditional modes of schooling they may naively demand. Each must learn from the other.

In a sense, it may be said that the Center proposes "high-risk" activities posited on the assumption that indirect approaches to conventional educational objectives may, in effect, be the most direct way. Parents must be helped to see, for example, through teacher-parent dialogues, that sitting down to a book may not be the most effective way to initiate reading, that a language-experience approach may, in the long run, bring about more effective reading skills. They will need to be reassured that such a school is not detouring their children into a watered-down curriculum but is beginning with their children's strengths--widening their perceptions, sharpening their purposes.

In the same sense, teachers will need to be helped to free themselves of guilt over not teaching the skills immediately. They will need to be educated in many teaching interventions by which children are involved in discovery, inquiry, experimentation, and lively expression of their experiences.

Such a curriculum will be characterized by a parent-teacher-child collaboration in defining needs, interests and interventions. The curriculum and the teacher's interpretation of it shall be open-ended and built on a research-development-research pattern. It will be a product of life in the immediate community, continuous team definition of needs and next-steps, hypothesis-making, intervention, evaluation of results, and further diagnosis.

The development of teacher-curriculum interactions may be characterized in terms of the following: Its point of departure in the lives of the children is rooted in usefulness for them. It is centered in activities and is multi-sensory in its approach. It utilizes concrete events as initial experiences and emphasizes concept development, with skills entering in as supports to concept development. It draws heavily on group activity, thereby giving children the support of their peers. Learning projects, to begin with, will be centered in small groups, thus reflecting the life style of the community and providing the highly sociable support such children are used to. As projects develop, there will be emphasis on small group behavior, with some turning into individual or pair enterprises and, as needs become defined, the use of individual programmed instruction. The teacher will serve as stimulator of projects, facilitator of children-initiated projects, diagnostician of needs, and planner of interventions extending the experiences of children and helping them to define their needs. There will be a high emphasis on interpersonal, intra-group, and intergroup content as a means to improve group life, capitalize on high interest in people, and improve the self-image through experiences focusing on a study of themselves and of man--his diversity and commonalities.

There will be much use of cross-age groups in which older children will teach younger and provide models for learning. Children will be taught how to use people of all ages as resources, how to use the community as a source of knowledge, how to organize their direct experiences and then, extend them through the use of films, pictures, recordings, books, etc.

The basic skills will be introduced as functional supports to children's projects, then, as needs for skills become clear to children, systematic programs for individual children will be developed in consultation with the child, on a self-selection basis.

Great emphasis will be placed on providing learning materials that serve a variety of cognitive styles, so that some children may acquire information through recordings, interviews, discussions, while other children may move rapidly into printed materials.

The Community-centered Teaching Laboratory will serve as research setting for the development and trial of new teacher-curriculum interaction modes. Parent-teacher-researcher teams will work with groups of disadvantaged pupils in the development (largely by trial and error at first) of school experiences that engage rather than alienate. When the team's confidence in the success of these modes is firm, they will be "packaged" in the form of teacher-training videotapes, manuals, workshop, syllabi, etc., and systematically field-tested in cooperating public schools.

A Training Syllabus for Teachers of a Second Dialect

A major problem in teaching the disadvantaged is language. For many of the disadvantaged, the curriculum is taught in what is almost a second language, or what has generally been called a "second dialect." The "first dialect" of the disadvantaged may be another English dialect (e.g., Negro speech or a mixture of Spanish and English), or it may, in fact, be another language (e.g., Spanish), but usually not in its standard form. One important curriculum development at present is the transferral of experience gained in teaching of a second language to the teaching of a second dialect. It goes without saying that not all second language-teaching techniques can be used in teaching a "second dialect." Obviously, pupil attitudes, motivation, etc., in "second dialect" learning are different from those in the second language-learning situation.

An important service of the Center would be the development of a syllabus, Practice Centered Teacher Training: Standard English as a Second Language or Dialect, which could fall directly in the area of concern of teaching the disadvantaged and could, at the same time, carry on work already begun.

Syllabi for the training of the teacher of French and Spanish were developed in 1966 and 1967. At present, we are engaged in research on the validity of some of the teaching performances recommended in the syllabus. It is not necessarily the function of the Center to prove the validity of all types of performance criteria which are assumed to be valid in the proposed training programs. For the syllabus for teaching standard English as a second dialect, next year would probably be the developmental phase. In other words, we could produce a Teacher Training Syllabus which, on the model of the ones written so far, would consist of the following:

(a) applied linguistics (contrastive analysis of standard English and elements of the pupil's first dialect: e.g., Negro speech and/or English influenced by Mexican or Puerto Rican Spanish or Mexican Spanish)

(b) a bibliography of linguistic materials, analysis of English, and second-dialect descriptions which could be used in a training course

(c) performance criteria for the teacher, which would be the most difficult to produce. The best we can now do is go through the existing literature, and perhaps consult and observe "successful" teachers in order to hypothesize what the most essential elements in such teaching might be. The teaching behaviors would have to be differentiated according to levels, age of the pupil, etc.

(d) micro-lessons" showing how _a_ and _c_ apply in the classroom

If we were to rely on existing materials only (e.g., existing descriptions of Negro dialects for _a_, "educated guesses" and transferal of "second language" teaching behaviors for _c_. The main need in the initial developmental phase would be staff time. Obviously, the next phase of the project would have to be a research phase: the validation of performance criteria described in Section C of the syllabus. Since pre-and post-testing is in many ways simpler in second-dialect learning than in second-language learning, this validation would probably use the "micro-criteria" paradigm. Various questions of timing would probably have to be left open at present. For example, should the syllabus be produced as a Technical Report before any of the research phase is undertaken? In some areas of the performance criteria for teachers, is it possible to formulate any meaningful research hypothesis before some exploratory study and field work has been undertaken? The writing of a (preliminary or tentative) training syllabus will be our goal for the next year.

The Computer as a Socializing Agent of Educational Technology Upon Non Curricular Dimensions of Children's Behavior

(Robert D. Hess)

This study is aimed at understanding the non-intellective effects of educational technology upon children, particularly upon their attitudes and orientation toward machines as sources of information and "authoritative" answers. Any projection of the growth of educational technology and the use of computers in instruction will necessarily include the possibility that much future teaching will take place in exchange between a machine and learner. However efficient machines may be in transmitting information and in teaching children to solve problems and to develop skills, there are very likely to be other effects of this confrontation between the machine and the child which would appear in "non-intellective" areas of the child behavior.

The conceptual background of this research is a view of the school as the major socializing agent for the pre-adult in American society. The school has, or soon will, replace the family as the most significant socializing instrument of our time. From this point of view, the school, whether it intends to or not, acts to transmit to the child certain ways of orienting himself toward the society, toward the authority of institutional representatives, toward preferred or valued ways of processing information and using it to relate to others. To the extent that the human teacher is replaced by impersonal devices, the machine will increasingly be involved in the transfer of information, in offering models of strategies for processing and organizing data, and in influencing other aspects of learning styles. These learning styles or adaptations which may be inherent in the child's response to the structure of the program may be exceedingly important in the socialization of the child to modes of dealing with an industrial, highly technological society.

The initial study will be concerned, however, with (a) the less "cognitive" features of the child's interaction with machines--his image of the machine's reliability as a source of information, of its infallibility, of its competence as a teacher in comparison with the human teacher in the classroom--and with (b) such other aspects as his ability or tendency to want to change or challenge, and a tendency especially in young children to personalize the mechanical source of messages. These are suggestive of the types of images and patterns of pupil response that would be studied.

A related problem is the impact of the new technology on the teacher, and her role in the classroom. Here the analysis might have two objectives--an examination of the qualities of machines in comparison with human teaching, and the attitudes of the teacher toward the machine and its possible effect upon her status and role in the educational system.

Another line of inquiry has to do with the attitudes of parents. Are they aware of the growing use of machines and the probably changes flowing from technological advances in education? Are they basically suspicious or admiring of technological resources being made available? Other questions should explore the possibility that the parental interest centers around the economics involved and the danger of obsolescence. The parents' own experience with technology in the society may be generalized to a mistrust of the long-term usefulness of any given investment in educational technology.

Of particular importance will be the impact of technology on the attitudes of children, adults, and teachers in disadvantaged areas. There is considerable evidence that adults and children from disadvantaged backgrounds tend to more accepting of educational authority and of high status and distant (non-challengable) sources of information. The machine may act to reinforce the feelings (prevalent in lower-class populations) of powerlessness, futility, and resignation to the system by confronting the low-status individual with a source of knowledge and information that has even greater status, in his eyes, than the teacher now possesses.

Research Plan. It seems appropriate to begin a research of this kind by exploring a number of conceptual schemes for organizing research questions and the type of data likely to be obtained. Some of these issues have been discussed with a number of people, including several graduate students who would join in a systematic survey of literature, both theoretical and empirical, and help construct an outline for organizing the more specific research operations to come later.

The initial research operations would be carried out during the period of conceptual planning. These would be a number of exploratory interviews with about 50 children, 10 teachers, and 10 parents, to probe the general contour of attitudes and information about educational technology and its use. The interview would cover questions about the view of the teaching machine or computer as infallible; the concepts held about the source of information that goes into a teaching program--that is, who decides, and what is the basis of its authority. Other areas would include questions about how the individual consumer can tell whether the program is wrong, or whether it gives biased information, the child's response to obvious machine errors, etc. The interview would also deal with attitudes about the effectiveness of the consumer in trying to change the program or affect the pattern, content, etc., of the material coming to him through the program. These attitudes are in part a matter of trust and credulity in his view of the machine as an authority. Indeed, the authority of the computer and the sources of this authority may be some of the most useful issues in the conceptualization of the design.

Another concern of this proposal is the interaction between the abilities and individual modality preferences of children and the type of instruction offered by machines. In particular, it would be of interest to see whether machine presentation, which is primarily visual, puts at a disadvantage the child who may have relatively greater preference for auditory input. The project may explore in more detail the relationships between machine-teaching format and types of output on the one hand, and learning and intake preferences of children, on the other.

The initial phase would include **observations** of children using computer-**assisted instruction**, if appropriate arrangements can be made with projects now using CAI.

The second phase of the study would be one of instrumentation. The review of literature, conferences with colleagues, and the interviews would identify areas into which more systematic inquiry would begin. This phase would be devoted to pilot testing of various techniques, including attitude measures, such as the semantic differential, attitude questionnaires developed especially for comparison of computers (teaching machines) with human teachers, and devices such as showing the subject statements written by hand on school stationery and contradictory statements written on IBM cards or computer output to see which is judged to be more credible.

The third phase would be to obtain, in more systematic fashion, data from appropriate subjects. This part of the study cannot be designed in advance of the initial stages, in part because of the unknown number of areas to be covered for each subject and the unknown length and complexity of the measuring techniques. It would include age, sex, and social class as sample parameters, with particular attention to the possible effects of social class or ethnic membership upon attitudes. It is possible, though not probable, that some manipulation of communication or programs might be developed at this point. More likely, however, the stage of experimentally manipulating the role or program of the machine would be deferred until the results of the descriptive and exploratory phases of the study were completed.

Significance of the proposed research. The research would yield information about the effects of variation in teaching techniques (machine vs. human) on a cluster of attitudes and beliefs which play a significant role in an individual's modes of processing information, especially in the acceptance or rejection of information offered by competing media in the environment. In addition, the study will throw light on the usefulness of the machine in teaching children from different backgrounds and with different preferences for intake modalities. Perhaps the most significant outcome would be information on the role of the human teacher in a classroom populated with non-human teachers and the implications of this information for a long-term planning in programs of teacher training.

There is a large body of data and theoretical discussion of many of the issues to be considered in this study. Much of this material appears in different format in various papers by Center staff members. This study would be relevant to much of the recent literature on the effects of social disadvantage upon children and the relationship of the structure of social and educational systems to individual behavior.

C. ADMINISTRATIVE AND SUPPORT PROGRAMS

The Research Methodology Unit

The general purpose of the Research Methodology Unit is to insure that the Center's projects use the best possible techniques in designing research, obtaining samples, measuring variables, statistical analysis, computation, data processing, and interpretating results. As the description of the Unit's operations and staff given earlier in this report indicates, these functions have been well served during the past year.

The Unit's main need at present is additional professional staff. Steps are being taken to employ one, or possibly two, additional experts in one of the specialties: statistics, measurement, design, and data processing.

Dissemination, Publications, and Media Unit

During the coming year, the Center proposes to establish a unit whose major attention will be devoted to disseminating the results of the Center's work. During the first two years, it was our belief that each project and program ought to be responsible for the whole continuum from research to development to demonstration to dissemination; that the purpose of the centers was to bring research and development into the more functional and closer relationship. Early in the first year, however, it became clear to us that there was need for special advice and assistance on research methodology. Consequently, we created a Research Methodology Unit which has functioned most effectively. Last year it became clear that, while a modest amount of dissemination was taking place through the different programs and projects in which our television services and film unit were beginning to play an important role, not all that the Center was doing was being communicated adequately to all of our interested audiences. We have, as of the date of this report, decided that a dissemination unit should be established. We have been conducting, and are almost at the end of, an intensive search for a person qualified to head this unit. That this unit should handle publications, editorial services, and our library, is clear.

What should be done with our television and film units is undergoing a thorough review. Television and film have great potential value for our work, but are also expensive. While they ought to be complementary, film and television making are so different that they have not always been as closely coordinated as would be desirable. By combining the best features of each medium within an educational media unit, the Center ought to be able to obtain the most productive relationship in terms of service, research, development, and dissemination.

Film and television possess data-storage potential not heretofore available to researchers in education. Investigators usually abstract from their experiments only those behaviors they choose to measure, and thereby lose what may be eventually far more important data. With complete audiovisual recordings, old data can always be reexamined in the light of new insights or ideas. The functions of a media unit can be to store data of this sort in a visual library for Center use. Television and film represent versatile research tools as well as uniquely powerful media for development and dissemination purposes. These media exemplify the powerful impact of educational technology currently being felt in communities and classrooms throughout the country. In addition to their rich contribution to research and development, the television and film units have the potential for providing the "picture window" through which research and development in teaching can be viewed by a wide audience. They have important use for teachers-in-training who may be taught to use the technology which they themselves in turn will be using in the schools.

In summary, an effective educational media unit would be concerned with data gathering, the development of new technologies which apply to the processes of schooling, the development of new research materials, and providing a training-ground for graduate students interested in the application of communications technology to research and development in teaching. But the critical questions of how much the Center itself should and must do as against how much it can employ others to do, is not easy to answer. We anticipate that during the coming year an experienced and qualified person will, with whatever outside experts he wishes to consult, bring this part of the Center's program to a new level of effectiveness.

D. CENTER MANAGEMENT AND ADMINISTRATION

This year, the Center enters a significant new era, both in its program and in its organization and administration. The details of its organization and administration have been set forth in a new set of Guidelines, presented in Appendix A; these Guidelines were adopted at the last meeting of the Administrative Board of the Center on March 20, 1967.

Their chief features are 1) adopting a unified directorship, 2) the creation of a small Executive Board with greater representation of the working staff of the Center, 3) the formation of an Advisory Panel, and 4) the formal organization and specification of the duties and responsibilities of the professional staff of the Center.

This re-organization is based upon extended discussions begun early in the fall in the Executive Committee and resulting in the following recommendation by the Administrative Board at its meeting on December 11, 1967:

> This Board recommends to the Dean that the Administrative Board and the Executive Committee of the Center be dissolved, that the Evaluation and Advisory Committee not be established, that there be formed a single committee which would function in an advisory capacity to the Co-Directors, and that additional internal operating and executive committees be organized by the Co-Directors as they see fit. It is understood that the timing and details of these changes will be worked out by the Co-Directors and presented at the next meeting of the Administrative Board.

These new Guidelines have emerged from extensive internal discussions at the Center, with the Dean of the School of Education, the Central Administration of the University, and the staff of the U. S. Office of Education. These discussions have taken place concurrently with the discussions of the new program formulation and the new Guidelines are consequently in harmony with them. The aim has been to locate more precisely and effectively policy determination and executive powers and responsibilities and to build more effective advisory, evaluative, and long-range planning machinery.

The responsibility for the coordination of each of the major program areas is specifically located in positions now formally built into the organization in a strengthened middle management-level arrangement. Responsibility for the coordination of the total program, so that it is continually kept in focus, is located in the new Executive Board with its designated Chairman.

An Advisory Council is created to bring resources from throughout the University, the surrounding school community, and the national scene whose expertness is most directly related to the Center's program. It will meet at least twice each year for two consecutive days to review the program.

The Research and Development Associates are organized into a formal body. It and the Advisory Council are assured direct access to the Executive Board, and the Executive Board's actions are to be communicated regularly in writing to the total staff of the Center. The Executive Board is specifically charged with responsibility for long-range planning and is authorized to create ad hoc, or more permanent, advisory committees for each of the program areas.

In its relationships with other educational agencies and institutions, the Center continues to make progress. It enjoys a strong relationship with the Far West Laboratory (see previous reports). We anticipate that this relationship will be further strengthened as our respective programs continue to mature and we are each able to feed the results of our work into the programs of the other. The Center has enjoyed favorable relationships with the school districts which have served as sites for its work. A productive relationship with San Jose State College is extending our teacher education efforts to the elementary level. We anticipate an even stronger relationship with some school districts as we move into the problem area concerned with teaching the disadvantaged where we intend to establish a new type of learning center, firmly rooted in the local community's leadership.

Our relationships with the State Department of Education have remained dormant despite our repeated efforts to enlist its more active involvement. This year, through the Advisory Council, we intend to make a new effort by tapping a different stratum of personnel in the State Department of Education. As we move into our new program, we may be able to discover more effective ways to use the resources of the State Department of Education. Although we regret this lack and have tried in a number of ways to overcome it, it must be observed that we have not been seriously handicapped in the development of our program, nor have we suffered from a lack of cooperation with the schools. How much more effectively the results of the Center's work would be planned, executed, or distributed and communicated to the schools with active State Department involvement remains an unanswered question.

The problems of administrating the Center arise mainly from the central problem which Allen Pifer, President of the Carnegie Corporation, noted in his 1967 annual report under the heading of "The Quasi Nongovernmental Organization."

> The most difficult problem which has arisen in connection with the quasi nongovernmental organization is how to reconcile its dual needs for independence and accountability to government. It was placed outside government by its originators for good reasons--among them that this should help ensure its freedom...an essential requisite to the functioning of this new type of organization.
>
> On the other hand, the quasi nongovernmental organization...remains almost totally dependent on the federal tax dollar.... This makes necessary a close accounability by it to government. It was, therefore, in a sense, born in a dilemma, and it has never escaped from the constant inner tension this has produced as it has been buffeted by the conflicting claims of independence and governmental accountability.
>
> The care for independence rests on the simple proposition that for the government to reap the real benefit that these organizations offer, they must be genuinely independent.../with/ anything less than this, their effectiveness will be compromised. Among the benefits, as we have seen, can be a special capacity for experimentation, objectivity, the ability to recruit specially trained or talented personnel, flexibility, economy, and efficiency. Each of these benefits is a direct function of the quality of the management.... This in turn is a function of the degree of independence which management is accorded. In short, able men know that freedom of action is essential to their own expert performance....
>
> There...(are) three minimum freedoms...if it is to have real independence: freedom of program, freedom of administration, and freedom of communication.

These essentials and difficulties which Pifer refers to have been the subject of many task forces in and outside of government. The central question is how to mobilize the great resources available in a University and bring them to bear in a coordinated way on the solution of crucial educational problems--in our case on teaching without unduly constraining the creative energies of persons who have chosen to work in the university setting. The unique advantage of that setting has been its emphasis upon a high degree of freedom and autonomy for scientists, scholars, and professionals. We are hopeful that a solution to this difficult central question can be found. Our experience, thus far, is that the way is not easy, but that we are making steady and, at times, rewarding progress.

E. A BIBLIOGRAPHY OF CENTER PUBLICATIONS

Res. Memo. #	Date	Title	Author
1	3/1967	Three Pressing Concerns of Educational Research	N.L. Gage
2	3/1967	An Analytic Approach to Research on Instructional Methods	N.L. Gage
3	3/1967	Applying the Language of Behavioral Models to Teaching Acts	F.J. McDonald
4	3/1967	Brunswikian Approaches to Research on Teaching	R.E. Snow
5	3/1967	Response Complexity and Experimental Design	R.E. Snow
6	3/1967	A Differentiated Teaching Staff	D.W. Allen
7	5/1967	Preference for Modes of Expression in Mathematics	K. Travers, R. Heath & L. Cahen
8	7/1967	Theoretical Formulations for Research on Teaching	N.L. Gage & W. R. Unruh
9	8/1967	Determining Causal Relationships in Socio-Psychological Inquiry: Four Techniques	N. L. Gage & A. H. Yee
10 (Revision)	3/1968	Evidence on the Generality and Correlates of the Teacher's Ability to Explain	Maria R. Belgard, B. Rosenshine & N. L. Gage
11	9/1967	The Relationship between Test Anxiety and Children's Need for Memory Support	Joan Sieber & L. I. Kameya
12			
13	10/1967	An Exploratory Study of the Relation of Teacher Competence and Performance to Pupil Attitudes toward Foreign-Language Learning	R. Politzer
14	11/1967	Missing Data in Analysis of Variance (with specific reference to BMD05V)	Janet D. Elashoff & A. Abrams

Res. Memo. #	Date	Title	Author
15	11/1967	Dynamics of Task and Process: The Classroom as Social Organism	R. H. Koff
16	12/1967	The Definition of a Cognitive Control Principle: A Case of Diminishing Returns	R. H. Koff
17	1/1968	Overcoming Secondary Ignorance: Learning to be Uncertain	Joan E. Sieber
18	1/1968	Toward a Model of Teacher-Learner Interaction	R. E. Snow
19	1/1968	Pre-Theoretical Considerations of UnUncertainty: An Aspect of Classroom	R. H. Koff & R. L. Warren
20	2/1968	Sociometric Choice: A Study in Pupillary Response	R. H. Koff & T. H. Hawkes
21	2/1968	Personality Correlates of Sociometric Situations	T. H. Hawkes R. H. Koff
22	2/1968	Teacher Preference for Teaching Situations: The Reaction to Teaching Situations Test	R. H. Koff
23	2/1968	Individual Differences in Decision Making	Joan E. Sieber
24	2/1968	Training Teachers as a Research Tool	F. J. McDonald
25	2/1968	A Paradigm for Applied Research on Modifications of the Effects of Test Anxiety on Intellective Processes	Joan E. Sieber
26			
27	3/1968	The Specification of Film-Attributes for Psychological and Educational Research Purposes	G. Salomon & R. E. Snow

Publications by R. L. Politzer:

Technical Report #1 -- Practice-Centered Teacher Training: French

Technical Report #1A -- Performance Criteria for the Foreign Language Teacher

Technical Report #2 -- Practice-Centered Teacher Training: Spanish (with Diana E. Bartley, Research Assistant at the Center)

Publication by F. J. McDonald and D. W. Allen: Training Effects of Feedback and Modeling Procedures on Teaching Performance

APPENDIX A

STANFORD CENTER FOR RESEARCH AND DEVELOPMENT IN TEACHING

Guidelines
for the
Organization and Operation of the Center

March 1968

Introduction

The organization of the Center consists of the following major components:

I. Officers
II. Executive Board
III. Advisory Panel
IV. Research and Development Associate Staff

I. Officers

A. Composition of Component

The officers of the Center shall consist of (a) a full-time Director of the Center and (b) a Chairman of the Executive Board, who are appointed by the Dean of the School of Education and serve at his pleasure; (c) Coordinators of the major program components in the Center, appointed by the Director in consultation with the Research and Development Associate Staff; (d) an Administrative Officer who is appointed by the Director and serves at his pleasure; and such other administrative personnel as the Director may designate.

B. Duties, Responsibilities, and Organizational Features of the Component

1. The Director is responsible under the terms of the principal and related contracts for supervising the work of the Center to assure that the terms and conditions of all contracts are met. He shall initiate proposals for action on matters of policy, program, personnel, projects, and budget. The term "initiate" here signifies merely the formal aspect of initiation; the Center encourages informal initiative, in the form of suggestions and recommendations, by all persons concerned with the Center. It shall be the responsibility of the Director to receive program and project proposals from Center Staff and from outside, to react to these, and to pass them on with his recommendations to the Executive Board for their consideration. The Director shall also implement the Center's policies and actions relating to program, personnel, and budget (a) by allocating personnel and funds according to the general plans adopted by the Executive Board, (b) by making appointments of Research and Development Associates with the advice and approval of the Executive Board, the Dean, and other University officials as required, and (c) by formulating the budget for the approval of the Executive Board and controlling expenditures accordingly. The Director shall be responsible for preparing the periodic reports to the U. S. Office of Education and other agencies requiring them, making use of the progress reports of the various project and program leaders. He shall perform any other functions not herein delegated to another group or individual. He may delegate such of his functions as may from time to time seem

desirable, while continuing to retain the ultimate contractual responsibilities mentioned above.

2. The Chairman of the Executive Board is responsible for coordination of the review and planning of the research and development work of the various program components of the Center. Specifically, he shall chair regular meetings of the Executive Board at which (a) the Director's proposals for action on matters of policy, program, personnel, projects, and budget will be considered, (b) progress in various program components and projects will be reported, reviewed, and evaluated, (c) desirable revisions of ongoing research and development projects will be formulated, and (d) plans for new programs and projects will be adopted.

3. The Coordinators of each of the various program components shall be responsible to the Director for implementing the research and development policies and programs established by the Executive Board. Specifically, each shall be responsible for (a) defining and clarifying the objectives of his program component, (b) relating the work of that component to the other components and to the goals of the Center, (c) assigning and coordinating the personnel allocated to that program component, and (d) reporting periodically in writing on the work of the program component.

4. The Administrative Officer shall be responsible, in the operation of the Center, for carrying out the duties assigned to him by the Directors. He shall act as secretary to the Executive Board and the Advisory Panel.

II. Executive Board

A. Composition of Components

The Executive Board shall consist of the Chairman of the Board, the Director, the Administrative Officer, ex-officio, as secretary, and not more than six professional staff. These members shall be appointed annually, in June, by the Director after consultation with the Research and Development Associate Staff. They shall normally be the Coordinators of the major program components of the Center, with at least one who comes from outside of the Staff of the Center.

B. Duties, Responsibilities, and Organizational Features of the Component

The Executive Board shall be responsible for formulating the goals of the Center, for establishing general policies and programs in harmony therewith, for reviewing and evaluating the progress of the various program components, for approving the appointment of professional personnel, and for adopting the budget. It will normally (a) meet once per month for two-hour sessions at a regular time, (b) have agenda prepared by the Administrative Officer, in consultation with the Director and the Chairman, distributed in advance, with supporting documentation, (c) meet with the Advisory Panel, (d) assist in policy interpretation and implementation, and (e) keep minutes of its meetings and distribute them to the Research and Development Associates. It shall create and ensure the effectiveness of mechanisms necessary to provide for long-range planning for the development of the Center. The Executive Board shall appoint ad hoc, or more permanent, advisory committees to the various programs of the Center as they are needed.

III. Advisory Panel

A. Composition of Component

The Advisory Panel shall consist of approximately 15 persons appointed for two-year staggered terms in June by the Dean of the School of Education upon recommendation of the Executive Board. The Dean shall annually in June designate the Chairman.. The members of the Panel shall be drawn in approximately equal numbers from

1. The Stanford University community, e.g., the School of Education, the School of Humanities and Sciences, other professional schools, institutes, and the Central Administration of the University.

2. Local, state, regional, and other educational agencies, e.g., the Far West Laboratory for Educational Research and Development, Supplementary Education Centers, colleges, professional associations, the Stanford Research Institute's Educational Policy Center, state departments of education, and city and county school systems.

3. Experts in fields related to the program of the Center.

B. Duties, Responsibilities, and Organizational Features of the Component

The Advisory Panel shall normally meet twice per year for two full days (1) to review and suggest ways in which all parts of the school and University community can be effectively used in the work of the Center, (2) to review the program of the Center, (3) to assess the Center's products, (4) to suggest ways for strengthening its current operations, and (5) to call attention to pressing educational needs and possible lines of development. It shall receive all reports and publications, including the regular reports to and from the U. S.

Office of Education, so that it may be fully informed of the work of the Center. The Panel shall be assigned sufficient staff to keep it informed and in other ways to assist it in the conduct of its work.

The expenses of attending meetings and an honorarium, to be established by the Executive Board, shall be paid by the Center. A written record of each meeting will be prepared and circulated to the Dean, the Executive Board, and Research and Development Associates.

IV. Research and Development Associate Staff

A. Composition of Component

The Research and Development Associates will be appointed by the Director, with the approval of the Executive Board, the Dean, and other University officials as required. The Research and Development Associate Staff shall constitute a formal body with the Director serving as Chairman.

B. Duties, Responsibilities, and Organizational Features of the Component

The Research and Development Associate Staff, and such others as they may designate, shall meet regularly at designated times to consider the work of the Center.

They shall receive and act upon matters referred by the Executive Board, suggest items for the Executive Board's agenda, and submit, either individually or collectively, written reports from time to time to the Executive Board and the Director.

They shall review the Director's appointment to the Executive Board and matters of interest to them which pertain to the aim, program, organization, and operation of the Center.

The Research and Development Associate Staff of the Center shall be appointed on the basis of two criteria: (1) their competence and its relevance to the program of the Center, and (2) their degree of commitment to the program of the Center, as reflected in willingness and ability to devote from one-third to one-half or more of their time to the Center's work.

APPENDIX B

STANFORD CENTER FOR RESEARCH AND DEVELOPMENT IN TEACHING

Professional Staff of the Center
for 1968-1969

I. Officers

1. Center Director - R. N. Bush
2. Chairman of the Executive Board - N. L. Gage
3. Coordinator of Program #1 - Heuristic Teaching - F. J. McDonald
4. Coordinator of Program #2 - Environment for Teaching - G. W. Sowards
5. Coordinator of Program #3 - Teaching the Disadvantaged - R. W. Heath
6. Coordinator of Research Methodology Unit - (to be appointed)
7. Coordinator of Publications, Dissemination, and Media - (to be appointed)
8. Administrative Officer - J. E. Thomas

II. Executive Board

1. R. N. Bush
2. N. L. Gage, Chairman
3. R. W. Heath
4. R. D. Hess
5. F. J. McDonald
6. G. Wesley Sowards
7. J. E. Thomas, Secretary

III. Advisory Panel

To be selected by new Executive Board

IV. Research and Development Associates

	Disciplines
Norman C. Alexander, Assistant Professor of Sociology	Sociology
J. Victor Baldridge, Assistant Professor of Education and Sociology	Sociology
Robert N. Bush, Professor of Education	Education
Elizabeth G. Cohen, Assistant Professor of Education	Education and Sociology
Sanford M. Dornbusch, Professor of Sociology	Sociology
Janet D. Elashoff, Assistant Professor of Education	Statistics and Education
N. L. Gage, Professor of Education and Psychology	Education and Psychology
Frank B. Hawkinshire, Research Associate, Education	Sociology and Psychology
Robert W. Heath, Research Associate, Education	Psychology
Kenneth E. Knight, Assistant Professor of Business Administration	Social Psychology and Systems Analysis
Robert H. Koff, Research Associate, Education	Education and Psychology
Henry M. Levin, Assistant Professor of Education and Affiliated Faculty of the Department of Economics	Economics
Frederick J. McDonald, Professor of Education and Psychology	Education and Psychology
M. David Merrill, Visiting Assistant Professor of Education	Education and Psychology
John W. Meyer, Assistant Professor of Sociology	Sociology
Robert L. Politzer, Professor of Education and Romance Linguistics	Linguistics and Education
Richard W. Scott, Associate Professor of Sociology	Sociology

Fannie R. Shaftel, Associate Professor of Education	Education
Joan E. Sieber, Assistant Professor of Education	Psychology
Richard E. Snow, Assistant Professor of Education	Psychology
G. Wesley Sowards, Associate Professor of Education	Education
Carl E. Thoresen, Assistant Professor of Education	Education and Psychology
Paul Wallin, Professor of Sociology	Sociology
Richard L. Warren, Research Associate, Education	Education and Anthropology

Signatures

This annual report and proposed budget are respectfully submitted by:

RNBush

Robert N. Bush
Director

N. L. Gage

N. L. Gage
Chairman of the Executive Board

Earl G. Cilley
Research Administrator